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ESSENTIALS OF DISEASES

OF THE

NOSE AND THROAT

ARRANGED IN THE FORM OF

QUESTIONS AND ANSWERS

BY

E. B. GLEASON, M.D., LL.D.

Clinical Professor of Otology in the Medico-Chirurgical College; Aurist to the
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PREFACE TO THE FOURTH EDITION.

NUMEROUS interpolations have been added and some omissions made in the text of the third edition with the object of bringing this volume abreast with recent progress in Rhinology and Laryngology. The section on Diseases of the Accessory Sinuses has been almost entirely rewritten and new chapters added on other conditions, with the result, it is hoped, of adding to the usefulness of this little book to the student and the general practitioner.

E. B. G.

July, 1906.

PREFACE.

It is hoped that the following pages will be a sufficient excuse for themselves. It is admitted that, to the learned specialist, the information they contain will appear superficial; but superficial information has its value to a beginner as a foundation for that more profound knowledge which only comes slowly through years of extensive reading, thought, and actual work in the diagnosis and treatment of disease. To the recent graduate in medicine, who wishes to take "a special course in a Nose and Throat dispensary," a little book will probably prove more valuable than a larger volume in enabling him to acquire, in the shortest possible time, those rudiments of Rhinology and Laryngology which are essential in order that he may understand and appreciate that which he sees and hears in the actual work of the dispensary.

It is also thought that this little book may prove useful to the busy general practitioner who, from the force of circumstances, finds himself obliged to treat disease of the nose or throat, and can find quickly here, in a condensed form, the essentials of diagnosis and treatment in any given case. The author has outlined that treatment of each affection that he has found by actual experience most satisfactory, and has simplified the matter as much as possible by mentioning only the few drugs, prescriptions, and operative procedures that are essential to the accomplishment of a desired result.

It is supposed that the reader is already familiar with the anatomy and physiology of the upper air-passages, and hence lengthy descriptions of anatomical structures and their functions have been omitted, the reader being referred for such to the Question Compends of this series on Anatomy and Physiology, or to the text-books on those subjects.

The author wishes to express his indebtedness to the books of Bosworth, Sajous, Brown, Woakes, and Seiler, and the writings of numerous other authors contained in current medical literature, for aid in the preparation of this little work.

E. BALDWIN GLEASON.

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ESSENTIALS OF DIAGNOSIS AND TREATMENT

OF

DISEASES OF THE NOSE AND THROAT.

THE LARYNGOSCOPE.

What is the laryngoscope?

The laryngoscope is a combination of two mirrors so arranged as to enable the observer to see the interior of the larynx. In the more common form the larger and concave mirror, called the reflector, is attached to the observer's head by a head-band, and the smaller and plane mirror, called the laryngeal mirror, is introduced into the back part of the mouth in such a manner as to be directly above the opening of the glottis; so that light reflected from the reflector upon the laryngeal mirror illuminates the interior of the larynx, and enables the observer to see its image upon the surface of the small mirror.

Give briefly the history of the laryngoscope.

Recent excavations at Pompeii have brought to light small metal mirrors with slender handles, that are supposed to have been used to inspect the accessible cavities of the body. In 1743 M. Levret, a distinguished French accoucheur, invented and used a small mirror for seeing small polypoid growths inside the nose, throat, ear, etc., and facilitating operations upon them. Dr. Bozzini, of Frankfort-on-the-Main, in 1807 published a work describing an apparatus he had invented for illuminating and examining the cavities of the body. His "laryngoscope" consisted of a tube, bent near its end at a right angle, and divided longitudinally by a septum into two portions. In each portion of the tube at its angle a mirror was set, so arranged that, when the tube was inserted into the mouth and its bent end directed toward the opening of the larynx, light passing along one division of the tube would be reflected downward into the larynx by the mirror contained in the instrument; while the eye of the observer, looking through the other portion of the tube, would perceive the image of the glottis reflected in the mirror which this portion of the tube contained. In 1825 Cagniard de Latour, and in 1827 Senn, of Geneva, each made unsuccessful attempts to examine the living larynx by means of mirrors. In 1829 Benjamin Guy Babington used a small mirror placed in the back of the mouth, while an ordinary hand-glass was used to reflect sunlight upon it. While Babington was perfecting his instrument, a mechanic, named Selligue, constructed an instrument similar to that of Bozzini, by means of which his physician, Bennati, said he was enabled to see the vocal cords. However, he brought about a cure of the throat affection from which Selligue suffered. A number of others worked in the same field, among whom may be mentioned Baumes, of Lyons (1838); Liston, using a dentist's mirror for laryngoscopy, in 1840; and Warden, of Edinburgh, a prism of flint glass, attached to a long stem, for the same purpose; whilst Avery, of London, employed a speculum, with a mirror in its end, for examining the larynx, which was illuminated from a concave reflector worn upon his head. In 1854 Signor Manuel Garcia, by means of a dentist's mirror and a hand-glass, was, for the first time, enabled to *study* the movements of his own vocal cords during phonation, and accurately described the registers of the voice in a paper read before the Royal Society of London in 1855. In 1857 Türck, of Vienna, began to use the laryngeal mirror on his patients, and he and Czermak, who substituted artificial light for sunlight, improved their apparatus until the laryngoscope was perfected to the form that is used at the present day.

Describe the laryngeal mirror.

The laryngeal mirror consists of an oval or round piece of silvered glass, mounted in a metal frame and attached to a wire stem at an angle of not less than 120 degrees. Such mirrors vary in size from one-half an inch to an inch and a half in diameter, and are numbered 1, 2, 3, 4, 5 by instrument-makers. However, smaller mirrors, Nos. 00 and 0, and larger mirrors, Nos. 6, 7, and 8, may be obtained, and are occasionally useful. The wire stem is either fixed in a handle of wood or slides into a hollow handle of hard rubber, or preferably metal, and is clamped at any desired length by a set-screw (Fig. 1).

Describe the reflector of the laryngoscope.

The reflector is a concave mirror of about twelve inches' focus, and made of silvered glass, mounted in a metal frame, so arranged that it is capable of attachment by a universal joint either to a head-band or the source of illumination. Two sizes are for sale in the instrument stores, one 3 inches in diameter, the other 3½ inches in diameter. The former has the advantage of convenience for carrying in the pocket or instrument-case because of its smaller size, and for examinations of the ear or nose or narrow cavities is as large as can be utilized readily. For examination of the pharynx and larynx the additional half-inch at the periphery of the mirror can readily be utilized, and furnishes additional illumination because the mouth is so much larger than the nares or auditory meatus.

What kind of head-band should be used to attach the reflector to the forehead?

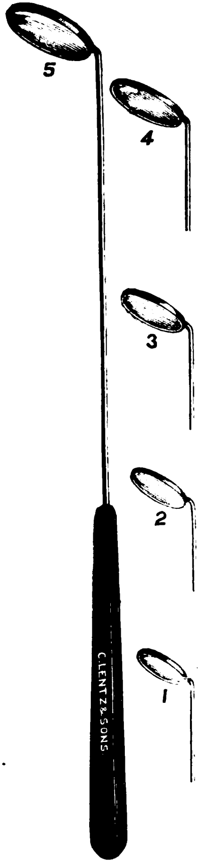

FIG. 1.—Laryngeal mirrors.

The instrument known as Fox's head-band (Fig. 2) consists of four steel, or preferably brass strips, because steel, though lighter, readily corrodes. The metal strips are hinged together so that they can be folded about the mirror, so as to protect it and form such a small and conveniently shaped package that both head-band and mirror readily can be carried in a pocket of the surgeon's clothing. When in use the head-band assumes the position of a line passing over the head from the forehead to the occiput. It is held firmly in position by the hinged bands, which when unfolded act as a spring. It has the advantage that at once it adjusts itself to heads of varying shapes and sizes, and hence is convenient in class-demonstration to pass from student to student. When constructed of nickel-plated brass, it is practically indestructable, and will outlast many head-bands made of elastic webbing or even of leather. However, it has the disadvantage of being heavy, and if worn all day upon the forehead becomes extremely irksome. Therefore a head-band of leather is decidedly the preferable instrument. The leather should be black to prevent discoloration by sweat. Head-bands of rubber elastic are soon corroded by sweat from the forehead and are rendered useless. The joint by which the mirror is attached to the forehead is by no means a matter of indifference, a double ball-and-socket joint greatly facilitates the adjustment of the reflected light, and renders it possible to bring the perforation in the center of the reflector closer to the eye, a decided advantage in examining narrow cavities like the nasal passages or the auditory meatus. Some years ago the author had made for use in his class-room the head-band shown in Fig. 3. At the time his principal object was cheap-

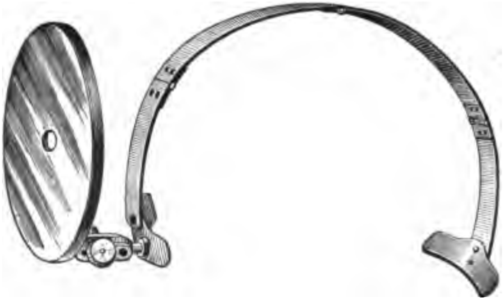

FIG. 2.—Reflector with Fox's head-band.

ness. The instrument, however, proved so light, comfortable, and efficient that it has become his favorite head-band for office use. It consists of a thin strap of black leather with a buckle, by which it can be adjusted to the diameter of any head, and there is also a ring and hook, so that it readily can be disengaged from the forehead. The leather is sewed to a nickel-plated brass plate. As the nickel is soon corroded from the under surface of the brass plate by the sweat from the forehead, and the metal when worn for a length of time stains the forehead, a small piece of gauze or chamois should be worn under it and renewed from day to day. Padding of any kind sewed to the metal forehead plates of head-bands are extremely objectionable, as they soon become foul from absorbed secretions.

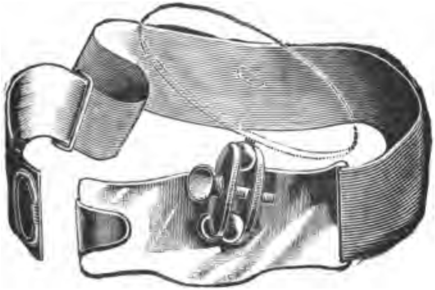

FIG. 3.—Head-band.

How should the reflector be worn?

The reflector should be worn upon the forehead over the left eye, and the light should be reflected from it upon the face of the patient, so as to form a circle, bounded above by the tip of the nose and below by the front of the chin. When worn over the left eye, with the source of illumination to the left of the patient, it is possible to secure a better illumination of the nose and mouth with less frequent manipulation of the reflector. If, however, the source of illumination be at the patient's right, the reflector is more conveniently worn over the right eye. Some laryngoscopists prefer to wear the mirror over the right eye, no matter what the position of the source of illumination. As a matter of fact, this method of wearing the mirror has several advantages, and when examining large cavities like the mouth there will be sufficient light reflected; but in making a minute examination of the fundus of narrow cavities, like the nose or ear, there is a distinct advantage in wearing the reflector with its central perforation as near the eye of the observer as possible; because then the axis of vision corresponds exactly with the axis of reflection, and hence the parts inspected receive the best possible illumination.

What sources of light are used in laryngoscopy?

An ordinary coal-oil lamp, or even a candle, the electric light, or a gas jet may be employed. Direct sunlight through a hole in the shutter may be used, and a plain mirror, instead of a concave one, should then be worn upon the forehead to avoid the excessive heat that might be sufficient to burn the patient if sunlight were concentrated upon any part with a concave reflector. Tobold, Mackenzie, and others have invented light concentrators, where convex lenses are used to concentrate the light upon the reflector. Such an apparatus, containing one or more lenses and made to fit over a student's lamp or Argand burner, can be obtained in the instrument stores. The apparatus shown in Fig. 4 is perhaps the best of these, and may be used either over an ordinary student's lamp, Argand burner, Welsbach light, or, as modified by Dr. Veeder, the electric light can be placed within the apparatus. The Welsbach light gives by far the most satisfactory illumination, but because of the frequent moving of the bracket the mantle has a much shorter life than if the light were stationary. However, in spite of this disadvantage, the Welsbach light is probably the best for office work and the Argand burner for the dispensary or elsewhere when the lamp is liable to rough handling. The electric light, after it has passed through the lens and been reflected by the mirror, yields a bright image of the filament with deep intervening and surrounding shadows. To overcome this difficulty, Veeder had the filament made into the form of a disk. The Veeder bulbs, while superior to the ordinary 16-candle electric-light bulbs, are still vastly inferior to the Welsbach light for laryngoscopy, and it is impossible to quickly warm the laryngeal mirrors over them,

As shown in Fig. 4, a mirror can be attached to the light concentrator in such a manner that it will reflect light into the nose, mouth, or ear, and thus do away with the necessity of wearing the mirror upon the forehead. This arrangement is a decided advantage, because a forehead reflector does not improve the personal appearance of a surgeon, and if worn all day is apt to result in a headache.

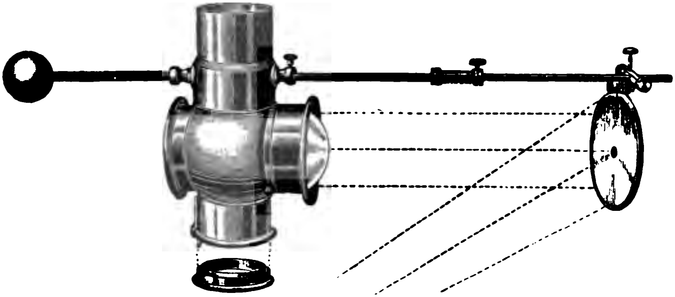

FIG. 4.—Light concentrator, with reflector.

A tube of ordinary sheet iron, without lenses, but with an opening in its side, when fitted over the chimney of an Argand burner or student's lamp in such a manner that the opening is opposite the flame, answers a very good purpose. Such an apparatus gives enough light for all ordinary examinations with the laryngoscope, and has the advantage that it may be used for the ophthalmoscope as well.

What is the most advantageous position for the source of light in laryngoscopy?

The source of light should be at the patient's left, somewhat behind him, and on a level with the top of his ear. As the heights of patients vary greatly when seated, it is well to have some means by which the position of the light can be quickly and conveniently changed. A student's lamp or Argand burner may be mounted upon a rod, upon which it slides, placed on the right side of the patient, and which can be clamped in any position by means of a set-screw. Mackenzie, of London, has invented an adjustable gas bracket, which, however, has the disadvantage that it requires both hands to change the vertical position of the light. The bracket shown in Fig. 5 is much to be preferred, as the light can be easily moved into the proper position, and clamped there by a single turn of the wrist, while it is not as liable to get out of order as those brackets which have no apparatus to clamp them firmly in any desired position. Dr. Wm. C. Jarvis of New York and others have devised electric laryngoscopes, in which a small incandescent lamp is mounted on the handle of the mirror in such a manner that its light is reflected by the mirror into the larynx; but, unfortunately, in all of these instruments some of the light falls directly upon the observer's eye, and interferes with distinct vision.

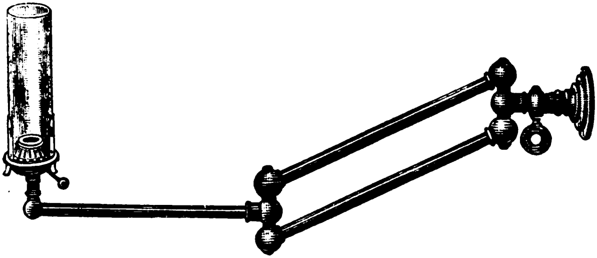

FIG. 5.—Adjustable gas bracket.

THE ART OF LARYNGOSCOPY.

What is laryngology?

Laryngology is the art of seeing and describing what is seen in the larynx. The word signifies a treatise on the larynx and its diseases.

What is laryngoscopy?

Laryngoscopy is simply the art of viewing the interior of the larynx.

What optical law is involved in laryngoscopy?

The optical law involved in laryngoscopy is that *the angle of reflection is equal to the angle of incidence.*

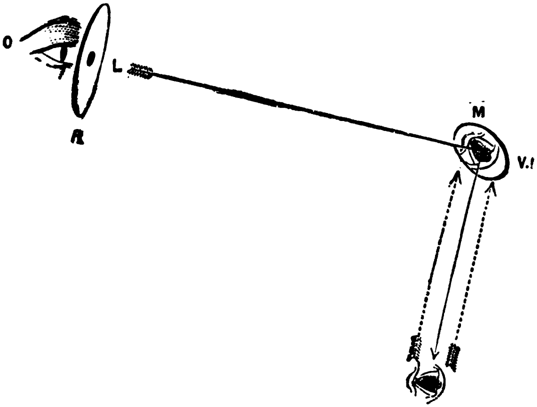

Fig. 6.—Diagram illustrating the principle of the laryngoscope (Lennox Browne).

How is this law practically illustrated in laryngoscopy?

This law is illustrated by the fact that the laryngeal mirror must be placed in the back part of the patient's mouth, above and behind the larynx, and at such an angle that light received on its surface is reflected downward into the larynx. The rays then forming the laryngeal image will return along the same path, and be reflected at the same angle into the eye of the observer. From this it follows that the nearer the center of the head-mirror is placed to the eye of the observer, the better will the image of the larynx be seen (Fig. 6).

In looking at the image of the larynx, what should we bear in mind?

We should bear in mind that the image is a reflected one, and that, therefore, it is reversed anteroposteriorly, owing to the fact that the laryngeal mirror is above and behind the opening of the larynx (Fig. 7).

Describe the relative positions of the patient and observer in laryngoscopy.

The observer should sit opposite to the patient, so that his eye is on the level with, and about a foot from, the mouth of the patient, whose head should be slightly raised and inclined backward. The knees of the observer should be either at the left or on either side of the patient's knees. For office use it is most convenient to have piano stools, which can be raised or lowered, so that the difference in the heights of different patients can be compensated for, and the eye of the observer can be brought on a level with that of the patient; while the patient's head may rest upon a cushioned framework fastened to the wall. If a head-reflector be used, it is advisable to obtain an easy position for the head, and *then* move the reflector until the disk of reflected light falls in the opened mouth of the patient with its center at the base of the uvula, thus illuminating all the surrounding parts.

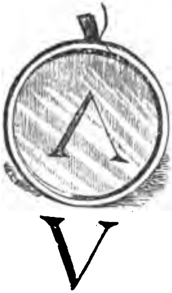

FIG. 7.—Diagram of laryngeal mirror, illustrating the reversion of the reflected image (Lennox Browne).

How is the laryngeal mirror introduced?

The laryngeal mirror is first warmed by holding it for a short time, with its reflecting surface, over a flame, to prevent moisture condensing upon it. The handle should be held between the thumb and forefinger of the right hand like a pen-holder, with the reflecting surface of the mirror downward. The forearm should be flexed upon the arm and the hand slightly backward upon the wrist and held a little below the mouth of the patient. By a forward motion of the hand and a slight raising of the arm, and unbending of the elbow, the mirror should be quickly carried into the mouth, following the curve of the hard palate until the back of the mirror touches and raises the uvula, pressing it upward and backward as far as possible. Meanwhile the left hand of the observer has grasped the patient's protruding tongue, holding it well forward by means of a towel or napkin to prevent slipping through the fingers.

How should the tongue be held by the observer?

The protruded tongue of the patient should be grasped between the outstretched thumb and index-finger of the left hand, protected by a napkin or towel to prevent slipping, in such a manner that the forefinger being placed against the lower teeth, projects above their edge, and thus forms a roller upon which the tongue can move without its frenum coming in contact with the sharp edge of the lower incisors. The thumb being placed on the upper surface of the tongue, and the middle finger above the chin of the patient, a slight rotatory motion of the observer's left hand will then not only control the motion of the tongue of the patient, but also keep all involuntary movements of his head in check, as the bit in a horse's mouth controls the animal's action. When the operator has to use both hands in operating or making applications, the patient should be taught this maneuver and requested to hold his tongue forward himself.

What precautions should be observed in introducing the mirror?

The mirror should not touch the tongue or palate; and, when in position, it should be held steadily and not allowed to tremble, or gagging as well as retching will result. Should the slightest sign of this occur, the mirror must be quickly withdrawn, and only re-introduced when the patient has had time to recover his breath and confidence; or the gagging will be repeated on an attempt to re-introduce the mirror, and the throat finally become so sensitive that a further examination will be impossible at that sitting.

When the laryngeal mirror is in position at the back part of the mouth, how is the laryngeal image brought into view?

The handle of the mirror is brought to one side until it lays in the angle of the patient's mouth, and the hand holding it is steadied by one or two fingers resting on the cheek of the patient. This procedure brings the hand out of the line of vision. The mirror is next slowly but steadily turned until the image of the larynx appears upon its surface. The patient should now be requested to say "Ah," in order to cause a rising of the epiglottis and bring the image into view.

How should the temperature of the mirror be tested?

The temperature should always be tested by laying the back of the mirror against the skin of the hand, and never against the cheek; because a slight abrasion of the skin of the cheek easily escapes notice, and may be inoculated with specific poison by the back of the mirror, which has previously come in contact with the secretions of a patient suffering from specific disease.

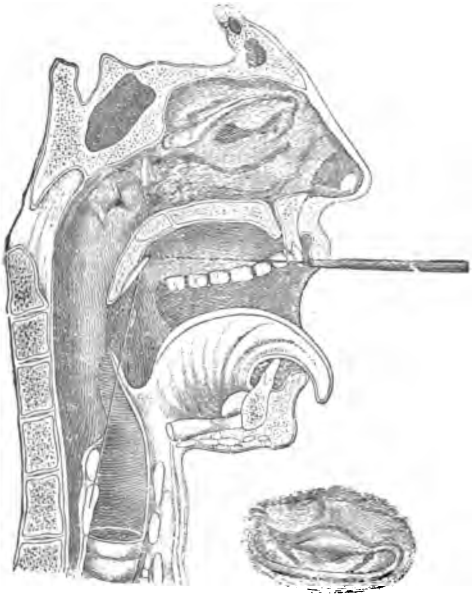

FIG. 8.—Sectional view, showing the position of the head of the patient which will give the minimum amount of view. The laryngeal image in such a case is represented in the smaller figure at the side (Lennox Browne).

What are the obstacles to laryngoscopy?

1. Irritability of the pharynx, produced by trembling of the hand holding the mirror, causing gagging and retching. 2. Want of proper adjustment of the light, without which the larynx cannot be illuminated, even when the mirror is in the

proper position. 3. Undue irritability or peculiar formation of certain parts of the throat. 4. Raising of the back of the tongue upon the approach of the mirror, in spite of the traction made upon its tip. 5. Too large or pendent epiglottis.

How should these obstacles be overcome?

Gagging and retching can generally be prevented by avoiding to touch the tongue and palate while introducing the mirror, and by holding it steadily in its proper position when introduced. Irritability of the pharynx may be relieved by letting the patient swallow a glass of ice-water before introducing the mirror; or, if that should fail, the use of a spray of cocain solution from an atomizer will generally produce the desired effect. If the back part of the tongue rises so as to obstruct the view, in spite of traction on its tip, it may be

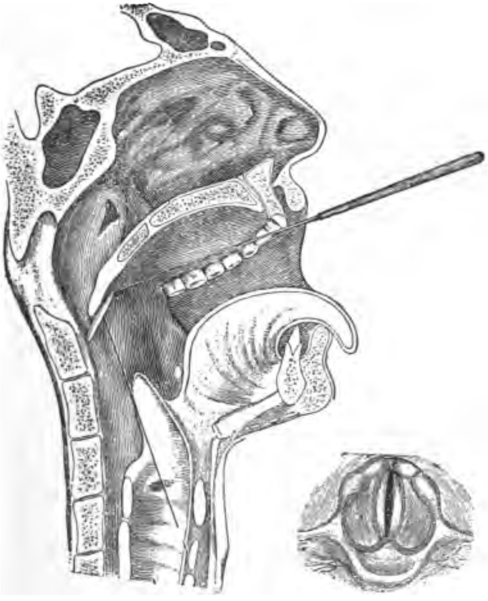

FIG. 9.—Sectional view, showing the position of the patient's head and the laryngeal mirror that will give a full view of the larynx. The laryngeal image in such a case is represented in the small figure at the side (Lennox Browne).

caused to lie flat in the mouth by steady pressure with a tongue-depressor (Figs. 10–12). When the epiglottis is too large or pendent, so as to obstruct the view, we can sometimes see the glottis by causing the patient to laugh or sing in a high pitch. If this fails, a pair of bull-nosed artery forceps, having a small weight attached to it with a thread, may be fastened to the margin of the epiglottis; thus keeping it elevated during the examination or operation by the small weight, which hangs out of the mouth.

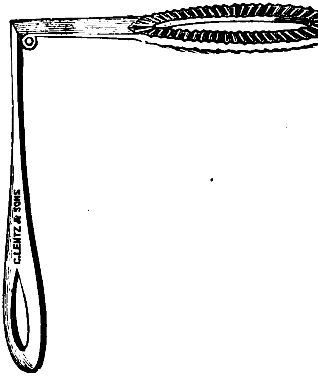

FIG. 10.—Folding tongue-compressor.

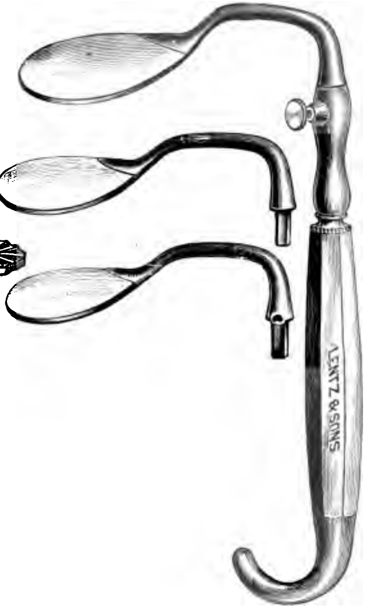

FIG. 11.—Turck's tongue depressor.

How is autolaryngoscopy accomplished?

The observer who wishes to study his own larynx should seat himself with his back toward a window through which the direct light of the sun enters. In front of him should be a plane mirror, so placed as to reflect a ray of sunlight into his open mouth. All being in readiness, he seizes his tongue with a napkin held in his left hand, and pulls it forward. His right hand now carries a laryngeal mirror to the back of the mouth, its progress being watched in the mirror before him. When properly placed, the sunlight from the plane mirror is reflected by the laryngeal mirror into the larynx, and its image appears upon the laryngeal mirror and is reflected forward upon the plane mirror, where it may be studied by the observer. Artificial light may also be used for autolaryngoscopy, by having the source of illumination at one side of, and on a level with, and slightly behind the observer's head; while a concave reflector is placed at one side of the plane mirror to reflect the light upon the laryngeal mirror in the back part of the mouth.

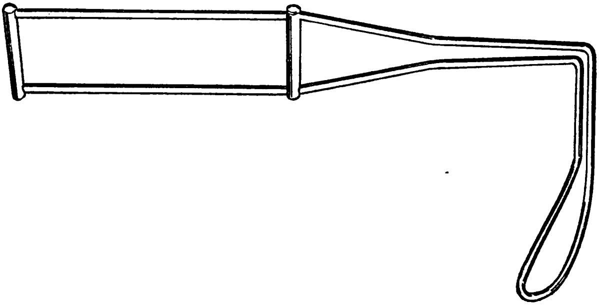

FIG. 12.—Wire tongue depressor.

How is infraglottic laryngoscopy accomplished?

In some cases in which tracheotomy has been performed and the cannula is fenestrated, a small mirror may be so introduced into the cannula as to obtain a view of the under surface of the vocal cords, which are red instead of white. Unfortunately, the mirror must be so small that little else can usually be seen.

LARYNGEAL IMAGE.

Describe the appearance of a normal larynx as seen in the laryngeal mirror (Figs. 13-15).

At the upper part of the mirror is seen the reddish-yellow arch of the epiglottis (L) with its cushion (C). In front of the epiglottis and extending downward across the mirror are seen two pairs of bands: the outer red, and the inner of a pearly white. The former are the ventricular bands (P), while the latter are the vocal cords (V). In deep breathing, a triangular opening is seen between the vocal cords, through which we can see into the inferior cavity of the larynx, and view the anterior part of the cricoid cartilage as well as some of the tracheal rings below it (W, P). In some cases two dark circles can be seen in the depth of the trachea, indicating the openings of the bronchi (B). During tone-production the opening between the vocal cords is narrowed to a slit, and this space is called the *rima glottidis* or *glottis* (chink of the glottis). At the termination of the vocal cords we see the arytenoid cartilages, with the interarytenoid space or commissure between them. From each side of this commissure, a fold, called the *aryepiglottic fold*, extends forward to join the arch of the epiglottis. Upon each of these folds we see two

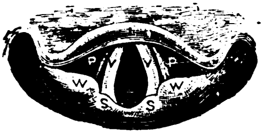

FIG. 13.—The larynx in gentle breathing (Lennox Browne).

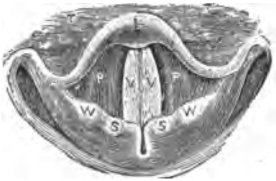

FIG. 14.—The larynx in tone-production (Lennox Browne).

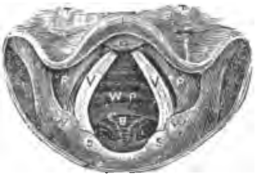

FIG. 15.—The larynx in deep breathing (Lennox Browne).

nodules: the cartilages of Wrisberg (w), and the cartilages of Santorini (s). These latter surmount the arytenoid cartilages. Attaching the epiglottis to the tongue is seen in the mirror a light-colored band: the glosso-epiglottic fold. On each side are two grooves, called the glosso-epiglottic fossæ. The color of the mucous membrane, as seen in the laryngeal image, varies from the pearly whiteness of the vocal cords to the reddish-yellow of the epiglottis, and the pink-red seen in other localities. There is also considerable variations of color, within the limits of health, in different individuals, and even in the same individual under different conditions. As seen by artificial light, it is always redder in color than when seen by means of direct sunlight.

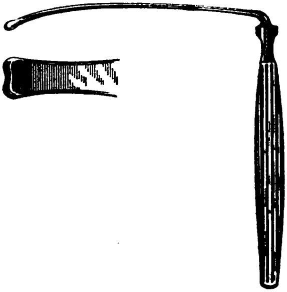

FIG. 16.—Tongue-depressor for pharyngoscopy and direct laryngo-tracheoscopy. Side-view and surface-view of the anterior portion. In some cases an instrument with a larger curve of the anterior portion is more practicable (Kirstein).

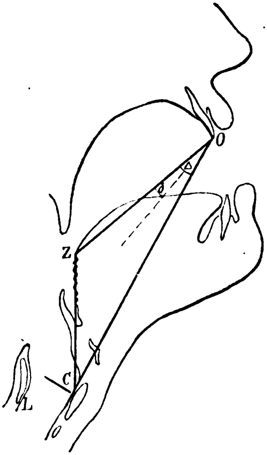

FIG. 17.—Displacement of tongue in autoscopy: *L*, larynx; *C Z*, normal position of tongue; *C O*, position of tongue in autoscopy (Kirstein).

What is autoscopy of the larynx and trachea?

Autoscopy of the larynx and trachea is a name given by its discoverer, Kirstein of Berlin, to a method of direct inspection of the living larynx and trachea by means of a special tongue-depressor (Fig. 16), by which the tongue can be drawn forward as well as pushed downward, as shown in Fig. 17.

Describe the position of the patient in autoscopy of the larynx and trachea.

The patient should bend the upper part of his body slightly forward, as shown in Fig. 18. For purposes of examination it is sometimes desirable that the patient remove his collar, especially if it be tight fitting. False teeth should always be removed. The observer stands in front of the patient, who is seated, and throws light from the reflector into the patient's open mouth. The tongue-depressor is grasped in the left hand in such a manner that its tip catches in the groove between the tongue and epiglottis, being careful not to rest the tongue-depressor on the anterior portions of the tongue. The base of the tongue is now drawn evenly and steadily downward and forward as far as possible without exercising any force. If these maneuvers are successful, the arytenoids

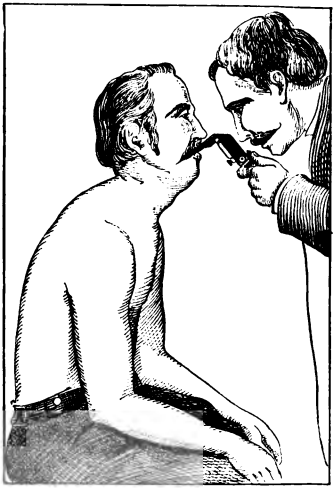

FIG. 18.—Position for autoscopy. This photograph was taken from a partly stripped patient in order to show distinctly the position of head and neck during examination (Kirstein).

are first brought into view and, finally, the whole interior of the larynx and a portion of the posterior wall of the trachea. In this respect the method contrasts with the use of a laryngeal mirror, in which, if the trachea is seen at all, it is a portion of its anterior wall.

Even in the hands of an expert, autoscopy as described by Kirstein yields satisfactory results in only a comparatively few adults and seldom in children. However, the student should practice the method until he becomes expert, and should be careful to exercise sufficient discretion and gentleness to

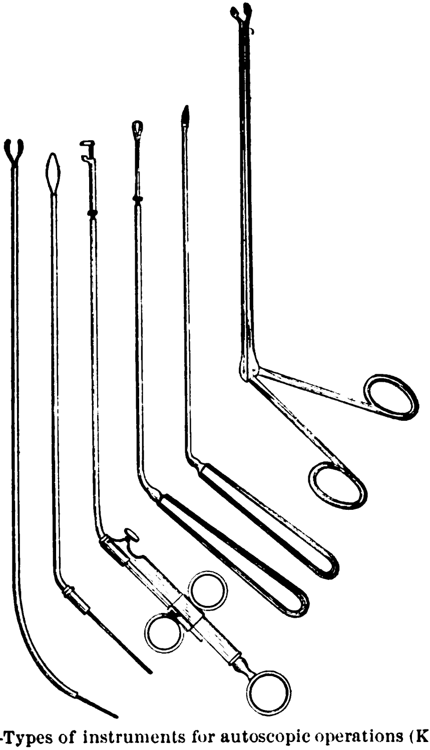

Fig. 19.—Types of instruments for autoscopic operations (Kirstein).

rarely if ever cause pain. Kirstein states: "The autoscope is an instrument in using which the physician can hurt *every* patient, but should hurt none."

What are the advantages of autoscopy of the larynx and trachea?

For purposes of examination it possesses rarely any advantage over laryngoscopy, although yielding a somewhat better view of the posterior wall of the larynx and trachea; but for those who have already familiarized themselves with the use of the mirror, the method seems more difficult and awkward. For the removal of tumors and foreign bodies from the posterior wall of the larynx or pharynx the method has great advantages, as straight instruments can be used under the direct guidance of the eye; but the anterior wall of the larynx and even the posterior surface of the epiglottis is rarely brought into view as well by autoscopy as by the use of a mirror. Fig. 19 shows the instruments that have been employed in autoscopy for the removal of tumors, foreign bodies, etc., from the larynx. Kirstein at first employed exclusively a somewhat complicated "autoscope" with electrical illumination, but it was afterward discovered that a sufficiently clear view of the interior of the larynx could be obtained by means of the reflector and tongue-depressor.

RHINOSCOPY.

What is rhinology?

Rhinology is the art of seeing and describing what is seen in the nose. The word is sometimes applied to a description of the nose, its diseases, and their treatment.

What is rhinoscopy?

Rhinoscopy is the art of inspecting the nasal cavities, and may be divided into anterior and posterior rhinoscopy. Anterior rhinoscopy is the inspection of the anterior nares through the nostrils, and posterior rhinoscopy is the inspection of the vault of the pharynx and of the posterior nares from behind.

2

What are the anterior and posterior nares?

These terms should be applied solely to the anterior and posterior openings of the anterior nasal cavities.

What is the posterior nasal chamber, or postnasal space?

The postnasal space, as it is at present most commonly called, is the cavity bounded in front by the posterior nares, above by the vault of the pharynx, behind by the pharyngeal wall, and below by the soft palate. It is frequently termed the nasopharynx.

How is anterior rhinoscopy accomplished?

The simplest method is to raise the tip of the nose with a finger, and draw the ala away from the septum by means of a bent probe. If now the patient's head is tilted somewhat backward, and a strong light is made to enter the dilated nostril, the nasal cavity will be illuminated for a considerable distance, and the condition of its lining mucous membrane may be inspected. The opening of the nostril may, however, be effected more conveniently by means of an instrument called a nasal dilator, of which there are an endless variety for sale in the market. Of these, perhaps the most useful is the nasal dilator of Bosworth (Fig. 20). A great many of the "Bosworth dilators" for sale in the instrument stores are nearly useless, on account of the manner in which they are constructed. The best which I have seen were made of German silver or brass nickel plated, so that the shanks of the instrument can be bent, in order to modify the amount of separation of its blades. The blades which enter the nose should be perfectly flat, without any outward flare to their tips, and so constructed that they are always perfectly parallel when separated or brought together. The blades should be

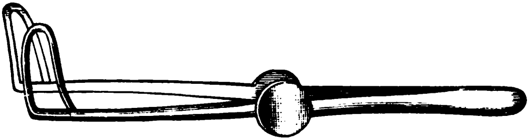

FIG. 20.—Bosworth's nasal dilator.

set upon the shanks at an angle of 110 degrees. When made in this shape, the instrument can be more quickly introduced into the nostrils than the author's dilator. Unfortunately, however, it is retained with so little firmness in the nose that it is frequently displaced during the course of a long operation and may fall upon the floor, greatly to the annoyance of the operator. The author's nasal dilator (Fig. 21) overcomes this difficulty by being in most noses entirely self-retaining, and may be attached to a head-band upon the patient's forehead in such a manner as to draw upward the tip of the nose sufficiently to secure the best possible illumination of its

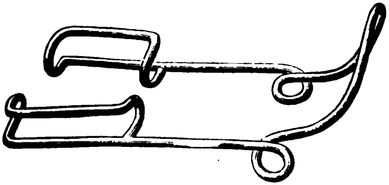

Fig. 21.—Nasal dilator.

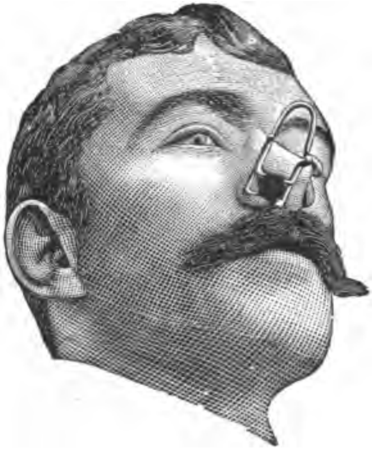

Fig. 22.—Self-retaining nasal dilator in position.

interior, and at the same time leave both hands of the operator free. The idea of devising such a speculum was given me by Dr. L. L. Palmer of Toronto, who, while visiting Philadelphia, showed me an eye-speculum which he had bent in such a manner as to serve an admirable purpose as a nasal speculum. A year or two before that time, however, Dr. Conrad Berens showed me a somewhat similar device which he had made himself by bending a piece of wire, and which, he stated, answered his purposes as a nasal speculum better than anything he had found in the instrument stores. Dr. Palmer very kindly went with me to Mr. Yarnall, the instrument-maker, but we failed to find any eye-speculum in his stock that would answer our purpose, so that I spent considerable time for some weeks afterward bending wires, until finally, with Mr. Yarnall's help, the instrument assumed the shape that I now use. Two sizes of the instrument should be at hand, and the spring of the instrument should be adjusted by bending until it does not cause sufficient pressure to occasion the patient pain or annoyance. The instrument is introduced by directing its blades along the floor of the nose until they have nearly disappeared within the nasal chamber, when the instrument is turned upward until it assumes the position shown in Fig. 22. The blades of the instrument grasp the rim of the nares in the same manner as an eye-speculum grasps the edge of the eyelids. Indeed, the instrument is but a trifling modification of the "plain" or old-fashioned eye-speculum employed by Dr. Palmer, but is somewhat more satisfactory, both as to shape and size. Almost any form of eye-speculum, if the nares be sufficiently large, may be used as a nasal dilator.

This dilator is intended only for operative purposes, and where the coarse hair or vibrissæ of the vestibule interferes with the view, they should be snipped off with scissors before beginning the operation. Myles' nasal speculum or dilator (Fig. 23.), has the advantage in that its solid blades push the hairs of the vestibule to one side so that they do not interfere with the view. However, the instrument is not nearly as self-retaining as that shown in Fig. 21.

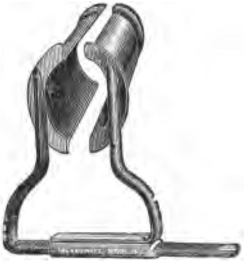

FIG. 23.—Myles' nasal speculum.

All nasal dilators, however, tend to expose the parts in a distorted condition, and thus deceive the observer as to the amount of breathing space that exists in the anterior nares. Harrison Allen's hard-rubber nasal specula, as they do not dilate the nostrils so widely, enable the observer to judge of the amount of obstruction to nasal respiration produced by a deviated septum or anterior hypertrophy much more accurately than he could do with a dilator; and a nest of these instruments should always be at hand to be used in such examinations (Fig. 24). When using either dilator or speculum, the instrument and patient's head should be moved in such a way that the different parts of the interior of the nose are successively brought in view. Any secretions that obstruct the view should be removed by means of the atomizer or forceps, or wiped away with cotton wrapped on the end of an applicator; and any change in the bulk of the parts should be tested with the probe, in order to determine its density. If an anterior hypertrophy obstructs the view of deeper structures, cocain solution should be applied to reduce its size and allow light to penetrate into the deeper parts of the interior of the nose.

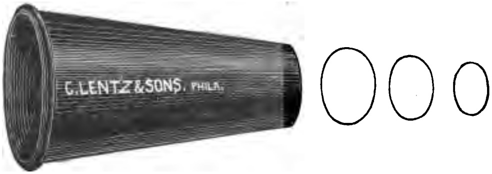

FIG. 24.—Allen's nasal speculum.

Describe the appearance of the interior of the nose as seen in anterior rhinoscopy.

The first structure brought into view is the vestibule, in which are seen a number of coarse hairs called vibrissæ, while a fold of skin or mucous membrane lies between the vestibule and the inferior meatus. To the inner side is the septum and to the outer side the inferior turbinated bone, forming the roof of the inferior meatus. Above the inferior turbinated bone is the middle meatus, roofed in above, except for the olfactory slit, by the middle turbinated bone. Through the olfactory slit in some individuals a portion of the superior turbinated bone may be seen.

How are the posterior nares examined?

Posterior rhinoscopy is to all intents and purposes the same process as laryngoscopy, except that a smaller mirror must generally be used, the reflecting face of which is turned upward instead of downward. The tongue, also, instead of being drawn forward with a napkin, is held down by means of a tongue-depressor. The relative position of patient and observer is the same as in laryngoscopy, except that the patient's head is not bent backward, but is either held perpendicularly or is inclined slightly forward. The rhinoscopic mirror having been warmed, should be introduced into the pharyngeal cavity behind the velum palati, and so placed as to reflect the light upward and forward into the vault of the pharynx and into the posterior nares. For this purpose a No. 1, 0, 00, mirror is generally most useful, but a larger mirror can sometimes be used to advantage, and should always be employed when the space between the palate and pharynx is insufficient to permit it. Posterior rhinoscopy is much more difficult than laryngoscopy; but, except in the case of young children, patience and dexterity will almost always enable the observer to obtain a glimpse of the various parts of the posterior nares and vault of the pharynx without the use of accessory instruments. When disease of these structures exists, or posterior hypertrophies or other neoplasms are present, the examination is usually easy because of their interference with the motion of the palate and the relatively wider space between the palate and posterior pharyngeal wall.

What are the chief obstacles to posterior rhinoscopy?

In many cases the palate will rise forcibly as soon as the mirror has been introduced, thus completely shutting off the view of the parts above. This difficulty can often be overcome by requesting the patient to breathe through his nose or emit a nasal sound like that of the French letter *n*. The observer should in all cases avoid touching the back of the tongue or pharyngeal wall, as otherwise gagging and retching immediately occur, and further examination is rendered futile. Excessive irritability of the palate and pharyngeal wall can usually be relieved sufficiently to permit an examination being made with the rhinoscope by painting the parts with a 4 per cent. solution of cocain. In operating, it is often essential to be able to watch the movements of the instrument in the posterior nares. Under such circumstances the ends of a piece of small rubber tubing, such as is used for drainage in small wounds, may be passed one through each nostril and

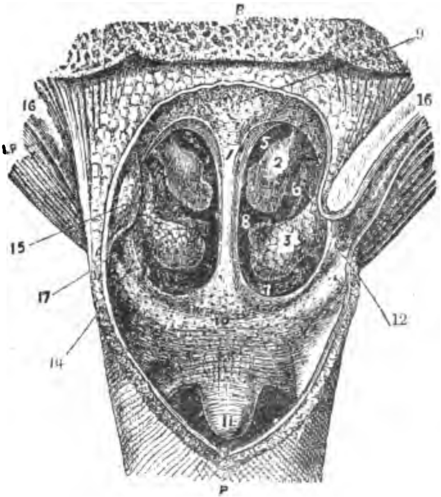

FIG. 25.—View of the posterior nares, the pharynx being laid open from behind: B, basilar process; P, pharynx; 1, septum; 2, middle turbinated bone; 3, inferior turbinated bone; 4, superior turbinated bone; 5, superior meatus; 6, middle meatus; 7, inferior meatus; 8, main passage of nostrils; 9, vault of the pharynx; 10, cushion of the soft palate; 11, posterior surface of uvula; 12, ridge formed by levator palati (L. P.); 13, salpingopharyngeal fold; 14, salpingopalatine fold; 15, Eustachian prominence or cushion; 16, Eustachian tube, closed on the left and laid open on the right side; 17, Eustachian orifice (after Luschka).

out through the mouth. If, now, these ends are drawn tight and passed under that part of the tube which is outside the nose, they will be held in position, and a sufficient amount of elastic traction will be exerted upon the velum palati to draw it downward and forward away from the pharyngeal wall and maintain it in that position. There is at first some gagging and sneezing, which quickly subsides, when the tubing may be maintained in position for some minutes without great pain or inconvenience to the patient.

Describe the appearance of the posterior rhinoscopic image.

Except in cases of cleft palate, it is impossible to obtain a complete posterior rhinoscopic image, such as is shown in Fig. 25, but by varying the position of the mirror, the different parts may be brought into view and studied one after the other. Usually the first object seen is a triangular plate, with its apex downward—the posterior margin of the nasal septum (1). Above it is a mass of glandular tissue called the pharyngeal tonsil, while at each side lower down are the crater-like orifices of the Eustachian tube (16). In front of these, and projecting toward the septum, are the posterior aspects of the turbinated bones. The middle turbinated bone is usually first brought into view, and rarely the dim outline of the superior turbinated bone may be distinguished above and in front of it. Below the middle turbinated bone the upper part of the inferior turbinated bone is readily perceived; but to see the lower part of this structure and the floor of the nose requires considerable practice in the use of the rhinoscopic mirror.

ACCESSORY INSTRUMENTS.

What other instruments besides those already described are necessary in examining and making applications to the interior of the nose and throat?

1. The sound. The laryngeal sound consists of a piece of silver wire, rounded at one end and inserted into a mirror-handle. It should be sufficiently long to reach the anterior angle of the glottis without bringing the fingers holding the handle into the patient's mouth, and thus obstructing the

view, and sufficiently firm to resist a considerable amount of pressure without bending.

2. The cotton applicator consists of a piece of steel wire of about the same size and length as the laryngeal probe, with roughened ends; so that a piece of absorbent cotton can be tightly wrapped around one end without fear of its becoming loose. This tuft of absorbent cotton will carry enough solution for any application within the laryngeal or nasal cavities, and, owing to its smaller bulk, is preferable to either a sponge or brush. For applications to the nasal cavities smaller instruments are desirable, and the instruments shown in Figs. 26 and 27 are better adapted for this purpose. Allen's probe consists of a conical piece of soft, malleable steel wire fitted into an aluminum handle. It is extremely light and delicate. When used as a probe, a few fibers of absorbent cotton are wrapped about its tip, in order to cover its sharp extremity. The tip of the instrument can be bent into the form of a hook to bring forward nasal polypi or ascertain their place of origin, the thickness of their pedicle, etc. The presence of exposed bone is readily detected by the spicules catching in the cotton fibers and imparting a characteristic resistance. It also may be used for the application of chromic acid and other caustics, which are either fused upon the tip of the probe, or the coarsely powdered particles of the caustic may be entangled in a few fibers of moist cotton wrapped about the tip, and thus safely conveyed to the location within the nose where the cauterization is to be made.

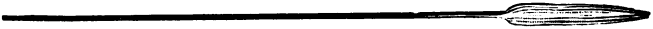
FIG. 26.—Allen's probe.

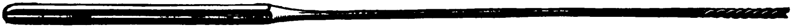
FIG. 27.—Allen's nasal applicator.

3. *The Atomizer.*—In most forms of throat and nasal disease sprays are extremely useful, not only to cleanse the parts and remove accumulated secretions, but also as a means of spreading medicated solutions over a large surface. For laryngeal and postnasal use, Sass' glass atomizing tubes are probably

the best for the use of toxic or expensive drugs, as they throw an exceedingly fine spray either upward or downward or straight forward. In these atomizers the fluid to be atomized is sucked up through one tube by a current of air being forced past its contracted orifice from the other tube. The Burgess atomizer is, however, preferable for washing out the anterior nasal cavities, as it produces a continuous coarse spray when used with a rubber bulb. In it the air from the rubber bulb or reservoir enters the bottle of the atomizer and forces the fluid upward through the tube until it reaches the contracted orifice, where by friction it is broken up into a spray. Being made with metal tubes, these atomizers cannot, however, be used for any fluid that would corrode them. They are made in three different patterns: one to throw a spray straight forward, one upward, and one downward, and are to be preferred to the larger and more clumsy hard-rubber instruments with movable or interchangeable tips. These instruments are made of heavy metal and thick glass bottles, and will outlast most of the cheaper atomizers. However, for a patient's use, what is sold as the "Magic" atomizer,

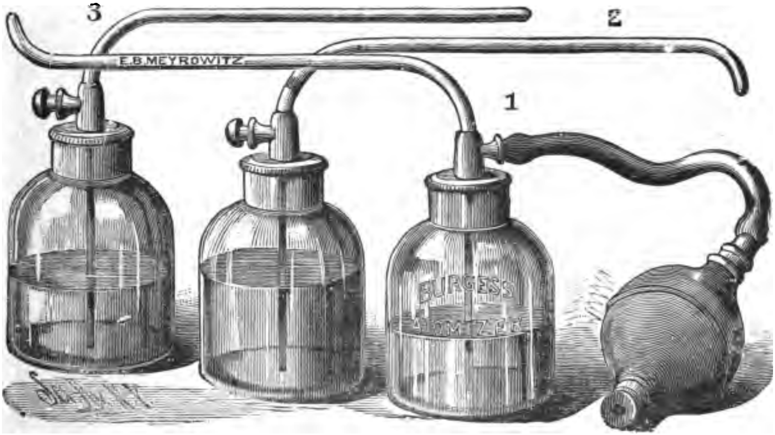

FIG. 28.—Burgess atomizers.

No. 2 (Fig. 29), is the preferable instrument. It has a nasal tube much shorter than the Burgess atomizer, and hence is less liable to clog and is more readily kept clean. However, the metal parts of the instrument are cemented to the glass bottle, which is made of somewhat thin glass. For fluids capable of corroding metal, the Magic hard-rubber atomizer is a desirable but somewhat fragile and expensive instrument. The tubes are not thick and clumsy like most hard-rubber instruments, being scarcely thicker than those of a metal atomizer, so that they can be introduced into the nose or pharynx and permit the operator readily to perceive what he is accomplishing. Each atomizer is provided with two interchangeable tips, one for throwing the spray straight forward and the other for throwing the spray in an upward or downward direction or to one or the other side by simply rotating it into the desired position. These atomizers are most admirable instruments, but are much more fragile than those made of metal, as the hard-rubber tubes become brittle after a time and are readily broken. The cement by which the hard rubber is attached to the glass also is a weak point in the atomizer, and sometimes breaks away from the glass. However, the short-nozzled metal and hard-rubber Magic

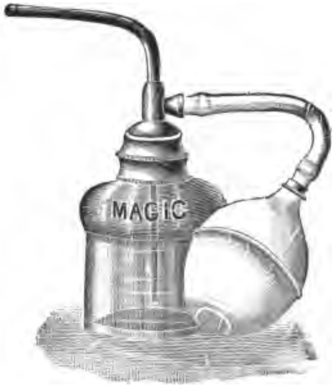

FIG. 29.—Magic atomizer, No. 2.

atomizers are probably the best the market now affords for general use.

The De Vilbiss atomizer (Fig. 30) is small and convenient for carrying in a hand-bag for use when visiting patients, and the "Century" atomizer (Fig. 31) is also useful for the same purpose, because, although large and clumsy, both as regards hard-rubber tubes and bottle, it is supplied with several extra bottles with screw-caps, so that several safely can be carried in the hand-bag, and contain the various solutions that are likely to be required all ready for use as soon as the metal cap is removed and the hard-rubber atomizer tubes are screwed into place. This atomizer is also provided with an adjustable tip which can be adjusted in such a manner as to

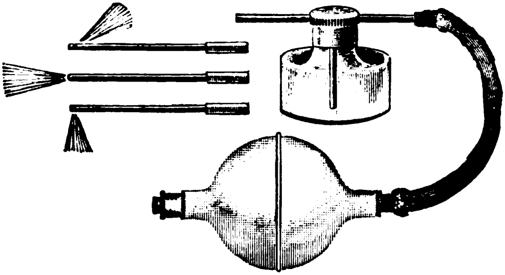

FIG. 30.—De Vilbiss atomizer.

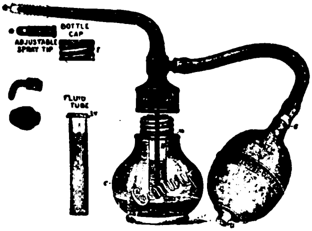

FIG. 31.—Century atomizer.

give either a fine or coarse spray. The idea of the inventor probably was to use the coarse spray for oil and the finer spray for watery solutions. However, it is a mistake to suppose that a different atomizer is necessary for the use of oils than that required for watery solutions, as the same atomizer may be used for either fluid, but an instrument yielding either a fine or coarse spray, as desired, is certainly an acquisition. This form of Century atomizer also is provided with a glass bottle, holding about two drams, which can be fitted inside the larger glass bottle and used for the atomizing of expensive or active drugs like cocain or adrenalin.

This form of Century atomizer is a most ingenious and durable combination atomizer. However, if its tubes were as small as the hard-rubber Magic atomizer, it would permit the operator to better see the parts that he is spraying. If it were provided with a tip that could be so rotated as to throw a spray either upward or downward, it would be a useful improvement, and if the bottle were of the same shape and size as that of the Burgess or Magic atomizer it would be more conveniently grasped by the hand, and the instrument would appear less coarse and ungainly.

The air-current necessary to produce the spray from atomizers may be supplied either by a rubber hand-bulb or an air-compressing apparatus. A good form of rubber hand-bulb is shown in Fig. 28. The main requisites are that the rubber should be of good quality, and its valves so constructed that they readily can be taken apart and inspected, so as to keep them in good order.

In spraying the nose, pharynx, or larynx with a hand atomizer, the bottle of the instrument should be grasped between the thumb and first finger of the right hand with the rubber bulb in the hollow of the hand. The rubber bulb can then be pressed by the three remaining fingers with sufficient force and rapidity to give a continuous spray. This method of employing the atomizer leaves the left hand free to elevate the tip of the nose or manipulate a tongue-depressor. In spraying the nasal cavities the tip of the nose should be elevated with the finger and thumb of the left hand, and the end of the atomizer should rest against either the thumb or finger of the operator, and not the rim of the patient's nose. The use of this method will prevent the necessity of sterilizing the end of the atomizer tubes each time they are used upon a patient.

Because secretions tend to gravitate toward the floor of the nose, especial attention should be directed toward the inferior meatus in washing out the interior of the nose. It is a good plan to tip the head of the patient slightly backward and direct the spray from the atomizer somewhat downward; that is, in a direction toward the lobe of the ear. Under such circumstances the nasal secretions that have accumulated on the floor of the nose are readily washed into the pharynx and are hawked down and expectorated. The stream of the atomizer can then be directed to any portion of the upper part of the nose which, on inspection, appears covered by semi-inspissated secretions.

For washing out the postnasal space an atomizer throwing a spray straight forward through the nose is generally sufficient; but in cases where partially dried and glue-like secretions are very adherent, the atomizer with a tip turned upward answers a useful purpose. The atomizer's tubes are introduced through the mouth behind the soft palate, and the patient's head is bent forward over a bowl. The spray from the atomizer should be very coarse and applied with considerable force. Under such circumstances a stream of fluid and mucus flows from the anterior nares into the bowl, or the masses of glue-like mucus adhering to the pharynx are dislodged by the coarse spray, and afterward hawked down and expectorated.

However, such masses of mucus are more readily removed from the pharynx by means of solid streams of fluid than by the coarsest spray from an atomizer. Therefore the postnasal syringe (Fig. 42) or Freeman's catheter syringe for cleansing the nasopharynx generally are more useful instruments. The tip is introduced behind the palate, the patient then leans forward over a bowl. The streams or stream of fluid is thrown with sufficient force into the postnasal space to dislodge the masses of mucus from the pharynx, and wash them forward through the nose into the bowl.

The interior of the nasal cavities can be cleansed as thoroughly by means of a hand atomizer as by means of an atomizer whose spray results from the use of the most expensive of air compressing apparatus; but the latter are convenient, and where a large number of patients are to be treated, save the surgeon's hand the fatigue that would sesult from long-continued use of the hand atomizer. There are a large variety of air-compressors for sale in the instrument stores, and it is difficult to state which one is the most practical and useful. The Burgess air compressor (Fig. 32) has the advantage over most of

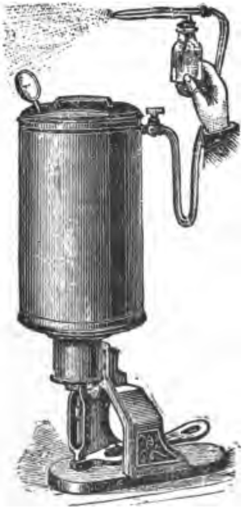

FIG. 32—The Burgess air-compressor, with Sass' atomizing tubes.

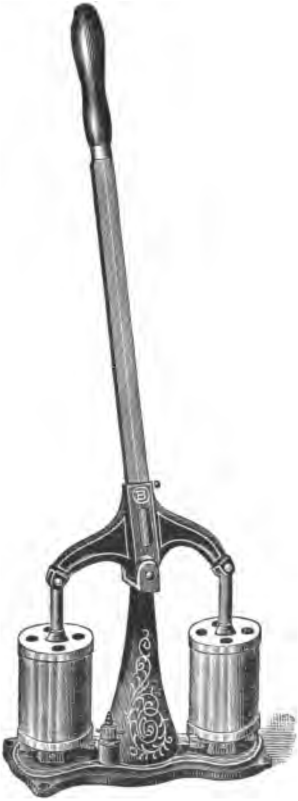

FIG. 33.—Double-action lever pump.

those with small air-reservoirs, inasmuch as the air is not compressed by means of a hand-pump, but by means of a foot-pump; and hence its use occasions less fatigue than when a hand air-pump is used. Fig. 33 shows a larger and more powerful apparatus for compressing air into the receiver.

However, the most satisfactory apparatus for furnishing compressed air is a water air-pump, such as is used by saloon-keepers for forcing beer and ale from the barrels in the cellar into the faucets in the bar-room. The water-pump is attached to a water-pipe in such a manner that water may run through it and flow into the waste-pipe or sewer. It is automatic and continues in operation until the air-pressure in the receiver equals that of the water in the supply pipe. The Buck Eye and some other pumps furnish an air-pressure double that of the water in the supply pipes, but are proportionately slow in their action. The Champion and Little Wonder air-pumps are rapid and effective instruments for furnishing practically an unlimited supply of compressed air. After somewhat numerous changes the writer prefers the Little Wonder as serving best under the conditions of the Philadelphia water supply, which frequently is very muddy. It should be borne in mind that mud and grit in the water supply will rapidly wear out metal valves, and clog up small spaces and pipes

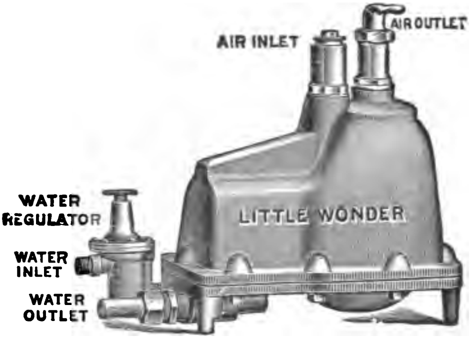

FIG. 34.—The Little Wonder pump.

and therefore necessitates the employment of pumps of simple construction.

As an air receiver, when one of these pumps is used, an ornamented copper cylinder may be placed in the surgeon's office; but nothing answers the purpose better than an ordinary galvanized wrought-iron cylinder or boiler such as is found in most American kitchens, as a reservoir for hot water as a part of the so-called "circulating boiler" apparatus for supplying hot water for domestic purposes. The water air-pump may be attached to the water pipes underneath the sink in the physician's office, and the air receiver placed down cellar, or both pump and air receiver may be placed in the cellar should the plumbing permit of such an arrangement. Whatever the position of the air receiver, a pipe or tube should lead from it to a stopcock upon the wall, immediately at the side of or beneath the adjustable gas bracket (Fig. 5). Attached to the stopcock there should be a rubber tube three or four feet in length, terminating in an automatic cut-off (Fig. 35). When compressed air is used for other purposes than supplying an air-current for atomizers, the pipe from the air receiver should terminate in a bracket of stopcocks from which rubber tubes lead to the nebulizer, the aural masseur, etc. The automatic cut-off is an instrument by which compressed air is conveniently supplied to an atomizer. The end of the instrument (*a*) is attached to the rubber tubing of the compressed-air apparatus, and the nozzle (*b*) of the instrument inserted into the hole in the nipple of the atomizer, from which the hand-bulb previously has been removed, and by pressing down the lever (*c*) a current of compressed air is forced through the atomizer in the same manner as if a rubber hand-bulb were used. The current of air ceases as soon as the lever (*c*) is released. In using the automatic

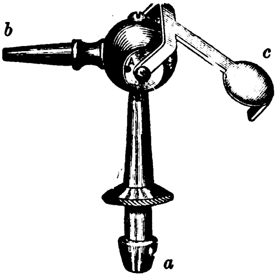

FIG. 35.—Boekel's automatic cut-off.

cut-off, the atomizer is held in the right hand and the lever of the automatic cut-off pressed downward by the thumb. A most convenient adjunct to a laryngologists office is a sink.

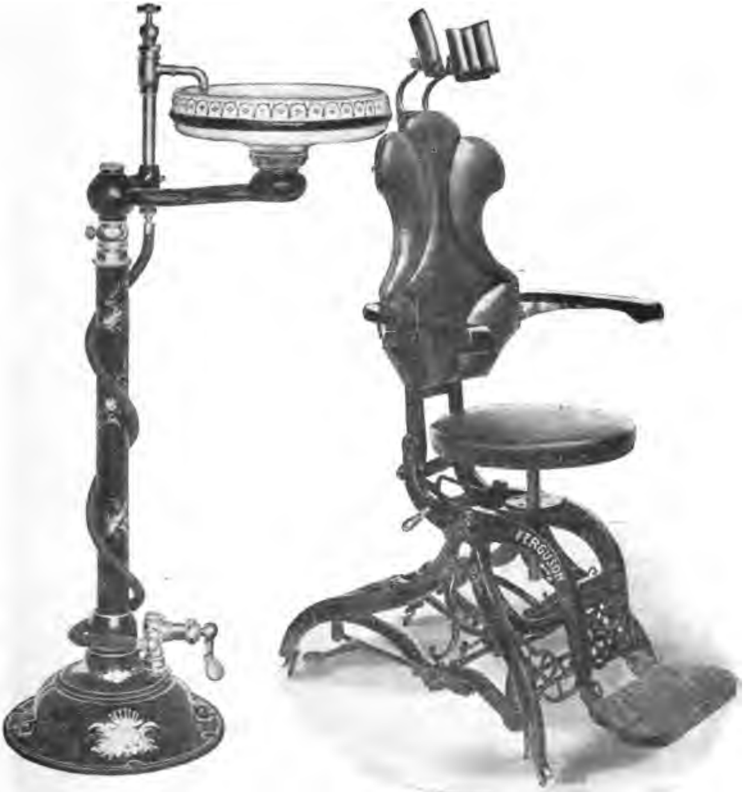

Fig. 36.—Water spittoon. **Fig. 37.—Chair for office work.**

It should be supplied with hot and cold water, and have sufficient space to accommodate a small sterilizer, heated by a Bunsen burner.

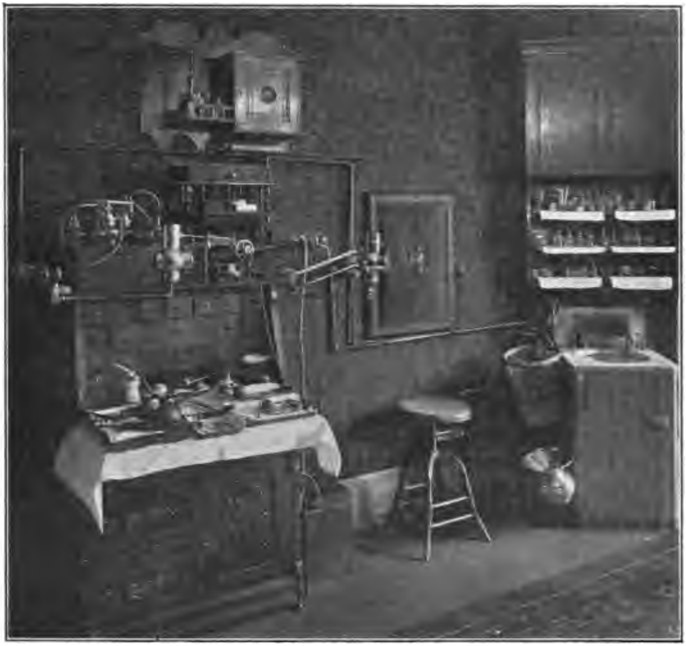

FIG. 38.—Photograph showing a somewhat convenient arrangement of apparatus. To the right is a sink with hot and cold water, and a small sterilizer between the faucets. The sterilizer is heated by a Bunsen burner, which is also utilized for sterilizing probes and other small instruments by simply passing them through the flame. Underneath the sink is a closet for large bottles holding "stock" solutions, etc. Above the sink are three shelves. The upper and lower ones for bottles, the centre one for atomizers. Above the shelves is a closet for apparatus only occasionally used. To the left of the sink is a waste paper basket for soiled napkins, a swinging cuspidor, and an air-pump. The compressed air from the pump is stored in reservoirs underneath the floor, and is thence carried by a pipe to the bracket of stopcocks at the left of the Mackenzie condenser. The compressed air serves to run the atomizers, the Wigmore ear-masseur, and the vaporizers shown in the cut. Air is supplied to any one of these by simply turning a stopcock. Upon the wall to the left of the sink is a padded framework before which the patient sits on the adjustable stool shown in the cut. The stool for the operator has been removed in order not to interfere with a view of other apparatus. Light is supplied by means of a Mackenzie condenser with an adjustable bracket. There are two condensers shown in the cut, The second one is used in case of emergency or by an assistant. Beneath the condenser is a storage-battery which is kept constantly charged with electricity by means of batteries in the cellar. To the right of the picture is a cabinet containing numerous drawers for instruments, etc. The instruments in daily use—such as tongue-depressors, specula, powder-blowers, probes, tuning-forks, etc.—are displayed in trays upon the desk of the cabinet, where they can be reached easily. The wall-brackets above the cabinet contain separate sets of instruments for use only upon syphilitics, consumptives, and others with contagious diseases.

A swinging spittoon, such as is used by dentists, may be attached to the wall or sink in such a manner that it can be swung out of sight when not in use. The water spittoon shown in Fig. 36, is an ornamental and cleanly looking adjunct to the office furnishings.

4. The nebulizer and inhaler, especially the former, are indispensable because vapors will penetrate where fluids and the spray from an atomizer will not. These instruments, therefore, are most useful in the treatment of diseases of the middle ear and the accessory cavities of the nose and the smaller bronchial tubes. Probably the most useful nebulizer is the Globe nebulizer. This instrument is manufactured in many styles, from the single nebulizer, for patients' use at home, to more elaborate instruments for office use, like that shown in Fig. 39, which consists of a number of nebulizers connected together in such a manner that one or more can be utilized at a time. The vapor from each vaporizer when in use passes through the mixing bottle shown in the center of the cut, and when two or more vaporizers are used at the same time their combined product is blended in the mixing

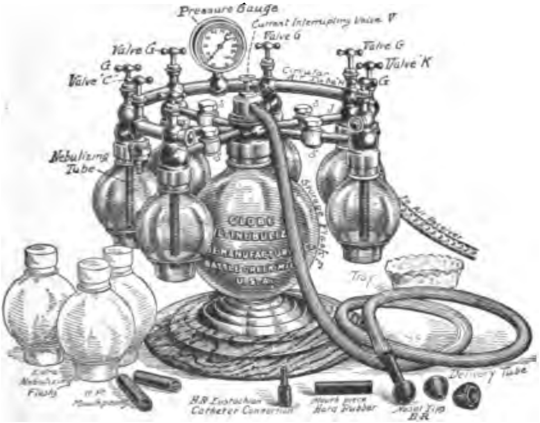

FIG. 39.—Six-flask Globe multinebulizer.

bottle before being inhaled by the patient. A valve (V Fig. 39) worked by the thumb or finger in the same manner as the automatic cut-off permits inflation of the middle ears and accessory nasal cavities, and by rapidly moving this valve, successive jets of vapor, as it were, may be thrown into these cavities, massaging the mucous membrane of the accessory cavities and the intratympanic structures. When used for this purpose, the nose-piece of the instrument is inserted into the patient's nose and he is told to puff out his cheeks. Puffing out the cheeks causes the soft palate to rise, and shuts off communication between the nose and nasopharynx with the rest of the respiratory tract. If now the valve *V* be pressed upon by the finger, the nebulized vapors enter the nose, its accessory cavities, and the middle ears. By rapidly working the valve *V*, the pressure of the vapor within these cavities is alternately increased and decreased, and the mucous membrane massaged. Excessive pressure within the middle ears can be

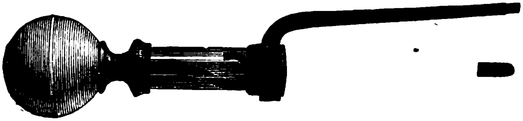

FIG. 40.—The reservoir powder-blower. The instrument is also made with curved tip.

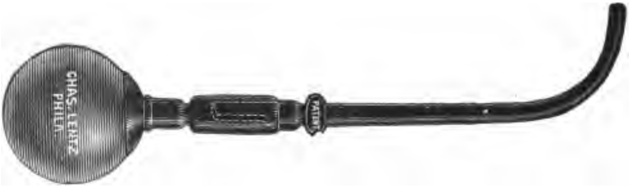

FIG. 41.—Powder-blower.

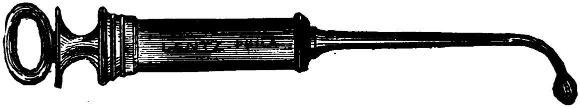

FIG. 42.—Postnasal syringe.

prevented by the patient stopping his auditory canals with the finger-tips.

5. Inhalers are mostly employed for the inhalation of the vapors of a drug suspended in hot water. The simplest form of this instrument is the bottle-inhaler, to be found for sale in most drug-stores. It consists, in its simplest form, of a wide-mouthed bottle, through the cork of which two glass tubes are thrust. One reaches nearly to the bottom of the bottle; the other passes simply through the cork, and is bent at the upper extremity. The bottle is filled one-third full of a solution, and the patient, by inhaling through the bent glass tube, causes air to bubble through the fluid and become impregnated with the volatile substances in the fluid before being drawn into the lungs. Mr. Hayes, a Philadelphia druggist, has devised a similar instrument of tin, which is very convenient when solutions have to be heated before being used.

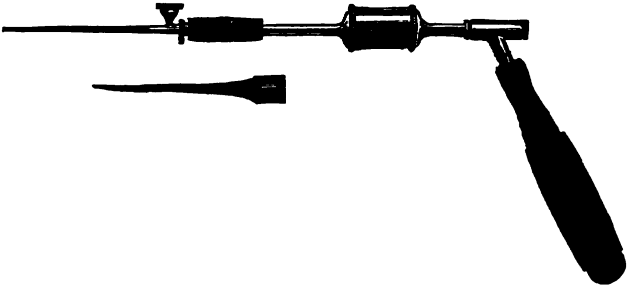

FIG. 43.—Van Sant's hot-air apparatus.

6. The *Powder-blower.*—Remedies are often applied to the interior of the nose and larynx in the form of an impalpable powder. For this purpose the instruments shown in Figs. 40 and 41 will be found useful. The reservoir insufflator is also a very convenient instrument, which obviates the necessity of loading the powder-blower each time that it is used. It has the disadvantage, however, of sometimes becoming temporarily clogged, and at the next attempt to use it discharges a

much larger quantity of powder than is required into the patient's air-passages. Sometimes a very large amount of powder will be unexpectedly thrown into a patient's larynx from this instrument, causing momentarily great distress and severe laryngeal spasm, which, however, quickly subsides if the patient is given a glass of water to drink and told to hold his breath for a moment. Such accidents can, however, be avoided by care on the part of the operator.

7. *The Hot-air Apparatus.*—Hot air is occasionally beneficial in the treatment of diseases of the upper respiratory tract and middle ear. It allays the swelling and irritation and decreases the blood-pressure. It is especially useful in acute inflammatory diseases of the accessory sinuses and middle ear, although the relief is often more transient than permanent. An effective method of application is the hot room of a Turkish bath. The modification of an apparatus used by dentists for drying tooth cavities, figured above, is occasionally useful, as it permits a continuous current of hot air to be thrown on inflamed tissue in any portion of the mouth, nose, or auditory canal. Sometimes it affords at least temporary relief from the pain and tinnitus of acute middle-ear catarrh. The apparatus consists of a cylinder of brass in which is enclosed a piece of gas carbon, and so constructed that it fits into a handle. The cylinder is heated over a Bunsen burner and the automatic cut-off attached to the handle. Air passing through the apparatus from the cut-off is heated as it passes around the gas carbon, and may be conveyed to the desired locality of the patient's nose, throat, or ear by means of one of a set of detachable end-pieces.

How may instruments be sterilized?

Specula, tongue depressors, applicators, probes, and other small metal instruments are most conveniently and rapidly sterilized by placing them in a steel-white enameled instrument tray, pouring over them a teaspoonful or two of alcohol, and then setting them on fire. The method is so rapid that it can be employed with advantage during the busy office hours in the presence of each patient as they follow each other for treatment. The method has the disadvantage of tarnishing in a short time nickel-plated instruments and of removing the temper from steel instruments, melting solder, etc. It is, of course, not adapted for saws, knives, cutting forceps, etc. Such instruments are best sterilized by boiling for five minutes before an operation in a 1 per cent. aqueous solution of baking soda.

The nozzles of powder-blowers, syringes, and other hard-rubber instruments should be kept ready for use in ground glass stoppered bottles containing a 5 per cent. aqueous solution of formalin (40 volume aqueous solution of formaldehyd gas), but should be rinsed in water and dried before being used.

EXAMINATION OF PATIENTS.

What is the best method of examination to be adopted for patients?

First listen passively to the patient's story of his illness; asking judicious, but not leading questions, so as to elicit the facts of the case, such as the influence of his employment upon his health, or any inherited tendency that he may have toward disease of the nose and throat or chest. Examine the tongue, as to whether coated or clean, pale, or flabby, or of a natural color and resistance; look for ulcerations or mucous patches upon the tongue or the inside of the mouth; and also notice the shape and condition of the teeth. Having depressed the tongue, observe the palate and uvula, the anterior pillars and tonsils, the posterior pillars and posterior pharyngeal wall. Notice any change from the natural color, shape, or mobility of the parts, the presence or absence of foreign bodies or hardened secretions. The nose should next be examined by anterior and posterior rhinoscopy, and, finally, the laryngeal mirror should be introduced. In these examinations, notice the condition of the parts in the following order, viz.: (1) color and condition of the mucous membrane; (2) size and shape of the part examined; (3) loss of substance by ulcers, etc.; (4) presence of foreign bodies, neoplasms, or accumulated secretions; (5) mobility of the parts and functional disturbances. During the examination touch any suspicious swelling with the probe, so as to ascertain its mobility, and whether it is composed of bone, cartilage, or softer structures. As the examination progresses, the result should be jotted down in the "case-book," and any deviation from the normal in size or shape, or the presence of neoplasms or foreign bodies, sketched upon the margin of the page.

PHYSIOLOGY AND PATHOLOGY OF MUCOUS MEMBRANES AND "CATCHING COLD."

What are the physiologic functions of the nose?

The terminal nerve-fibers from the olfactory bulbs are distributed in the mucous membrane covering the superior turbinated bodies, the upper part of the septum, and the anterior and upper portions of the middle turbinated bodies. The mucous membrane of this *olfactory portion of the nose* is of a peculiar yellow hue, has no mobile cilia, and is less richly supplied with blood-vessels than that of the inferior and middle meati or *respiratory portion of the nose.* During respiration the bulk of the air passes along the septum above the inferior turbinated body, describing a semicircle in its course, and extending upward nearly to the roof of the nose. Abnormal dryness of the nasal mucous membrane, or nasal obstructions of a kind to interfere with the free access of air to the olfactory portion of the nose, interfere greatly with the acuteness of the sense of smell.

The nose also serves as an additional resonant cavity during vocalization, so that obstruction of the nasal chambers invariably produces a peculiar nasal intonation during speech. Perhaps the most important function of the nose is to warm, moisten, and free from dust the inspired air. In health the nose secretes about one pint of serum in twenty-four hours, mostly by a process of exosmosis from the numerous blood-vessels of the mucous membrane and erectile tissue; this serum, mingled with the secretions of the mucous glands, disappears, when the parts are in a healthy condition, without the individual being made aware of its presence. The more watery portion saturates the inspired air with moisture; and, of the residue, part is re-absorbed and part swallowed, while the moist condition of the mucous membrane serves to catch and retain particles of dust floating in the inspired air.

What three forms of inflammation are most common in mucous membranes?

Acute and chronic catarrhal inflammation; croupous inflammation; diphtheritic inflammation.

Describe these three forms of inflammation.

In acute catarrhal inflammation an increased blood-supply stimulates the epithelial layer of the mucous membrane to increased activity; new cells are rapidly formed and cast off, while the glands pour out their secretion in excessive quantities and an abundant liquor sanguinis transudes the vessels, the mucous membrane at the same time appearing red and swollen. Chronic catarrhal inflammation differs from acute catarrhal inflammation in that the subepithelial layer of the mucous membrane is more involved. Connective tissue is developed by a slow process of proliferation. Usually the mucous membrane is thickened and hypertrophied; but, in some instances, the new tissue may be so placed as to press upon the glands and follicles, giving rise to atrophy and the so-called atrophic or "dry catarrh." Also in catarrhal inflammation of the mucous membrane there sometimes occurs increased activity in the lymphoid cells, finally producing hypertrophy of the tonsils or other adenoid structures. Activity of morbid processes, confined largely to epithelial and lymphoid structures, belongs essentially to the younger period of life; while morbid activity in the connective-tissue structures belongs essentially to later life, rendering it much more difficult to bring about a cure in the catarrh of an adult than in that of a child.

Croupous inflammation is of a higher grade than catarrhal; for, while it commences in the same manner, with increased blood-supply, rapid cell-growth and proliferation, increased secretion, and a throwing off of immature cells, leukocytes, and liquor sanguinis, it differs from it in the fact that the exudate contains a large amount of fibrin and albumin, which coagulate upon the surface of the mucous membrane, forming a false membrane. This false membrane is at times so soft and almost granular in character as to be easily removed with a soft brush. At other times it is tougher and difficult of removal; but, in either case, when removed, the mucous membrane is left intact or only deprived of some superficial epithelial cells. Diphtheritic inflammation is also characterized by the formation of a false membrane, but its pseudomembrane permeates the mucous membrane so densely that it can only be removed by bringing away with it the entire thickness of the mucous membrane to which it is attached, thus leaving the parts below completely denuded. A diphtheritic pseudomembrane is of a dark grayish color, resembling somewhat an ordinary slough of the mucous membrane, in contradistinction from a croupous membrane, which is of a bluish-pearl color, with no appearance as of sloughing of the parts.

What changes take place in the secretions of the upper respiratory passages as the result of catarrhal inflammation?

The secretions are either increased or decreased in quantity, so as to either flood the parts or leave them unnaturally dry. It should be borne in mind that the normal secretion of the nasal mucous membrane is over sixteen ounces of clear watery mucus in twenty-four hours, a part of which in health passes unnoticed through the nasopharynx down into the esophagus and stomach. Only when by obstruction or irritation, due to any cause whatever, this easy outflow and abundant secretion is interfered with, do we perceive a thickening and an accumulation of the secretion of the mucous membrane, which is designated as phlegm, and is composed largely of epithelial cells in a state of fatty degeneration, mucous corpuscles, and the impurities filtered out from the inspired air. When mixed with pus or blood, the secretions become yellow, green, or brown in color; and if retained upon the mucous membrane for a sufficient length of time the secretions become offensive as the result of putrefactive changes.

What is the modus operandi of "catching cold"?

"Catching cold" is the result of a transient influence upon the vasomotor system of nerves, producing an uneven distribution of blood in the capillaries, especially manifesting itself as a congestion of the mucous membrane of the upper respiratory tract, followed in most instances by inflammation, swelling, and either diminished or excessive perverted secretion. It is probable that the phenomenon of "catching cold" is largely of a reflex nature, in which the peripheral sensory nerve fibrillæ of the skin and extremities perceive the abstraction of heat as a shock, and being afferent in their conductive function, convey the impression to their respective ganglia, whence it is reflected by means of the efferent vasomotor fasciculi to the vessels, causing their dilatation and congestion, and, finally, inflammation of the structures containing them. This theory not only explains the ordinary phenomena of a "cold in the head," but also the pain of neuralgia and rheumatism suddenly produced by "catching cold." Dilatation of the vasonervorum, resulting perhaps in the effusion of serum, produces pressure upon a nerve within its sheath and consequent pain in the muscle or skin containing it.

Why is it that a chilling of the surface of the body will produce an inflammation of the mucous membrane of the upper respiratory tract?

The reason why the mucous membrane of the upper air-passages is the most frequent seat of an inflammation due to cold or a chilling of the surface of the body is that the sudden change of temperature produces, in the first place, an effect upon the sensory nerve-fibers in the skin, which impression is communicated to the vasomotor centers, and consequently results secondarily in a contraction of the blood-vessels of that portion of the skin which has been affected. As there is a certain amount of blood in the vascular system at a given time, a sudden contraction of any portion of that system must, according to the law of hydrostatics, cause a corresponding dilatation at some other portion, which is that portion which is least able to resist the pressure. Inasmuch as our variable climate, the impurities of the atmosphere, and our artificial way of living have a tendency to weaken the capillaries of the upper air-passages from early childhood, that portion of the human economy is therefore the region most liable to suffer from this unequal distribution of blood. There results first engorgement of the parts with increased secretion, and, finally, inflammation.

DISEASES OF THE NOSE.

Name the chief diseases of the nasal cavities.

Acute rhinitis or coryza, simple chronic rhinitis, hypertrophic rhinitis, atrophic rhinitis, syphilitic rhinitis, vasomotor coryza or hay-fever; the various neoplasms—myxoma, fibroma, papilloma, cyst, ecchondroma, exostosis, sarcoma, and carcinoma; diseases of the septum—deviation of the septum, hematoma, abscess, and submucous infiltration of the septum; epistaxis, rhinolith, and foreign bodies in the nose.

What is the effect of disease of the nasal passages on other parts of the body?

The disease may extend to the pharynx, ear, or larynx by continuity of structure, or affect the other respiratory organs by abeyance of the functions of warming, moistening, and filtering the inspired air, so that it enters the pharynx cold, dry, and dust-laden, thus producing disease of the pharynx, larynx, and even of the parts below them. Chronic laryngitis frequently results from this cause; and while it is not easy to prove that pneumonic phthisis is directly the result of atrophic rhinitis, yet it is difficult not to suspect some such relationship between the two diseases in the same individual. As the result of nasal disease there are often induced certain reflex phenomena, viz., nasal cough, nasal asthma, nasal vertigo, nasal epilepsy, nasal chorea, hay-fever, pareses of the palate and larynx, neuralgia and headache, reflex skin rashes, affections of the eye, both inflammatory and muscular, and diseases of the ear.

The term "reflex" is, doubtless, often misapplied, yet it has a definite significance, and the reflexes which originate in nasal or nasopharyngeal irritation and terminate in cough, laryngeal spasm, or asthma, follow much the same pathway as the reflex known as sneezing. The nasal branches of the ophthalmic division of the fifth nerve and the nasal branches of the anterior palatine descending from Meckel's ganglion, which is in connection with the superior maxillary division of the fifth nerve, conduct the sensory impressions to the medulla. It is there reflected to the respiratory, pneumogastric, and other centers, whence the deep inspiration, the forced expiration, and the coincident spasm of the pharyngeal and laryngeal muscles, termed a sneeze.

This mechanism, of course, varies somewhat with the different reflex acts, and in the group constituted by reflex pareses considerable complexity may enter by implication of the vasomotors through the superior cervical sympathetic ganglion.

ACUTE RHINITIS.

What is acute rhinitis?

Acute rhinitis is an acute catarrhal inflammation of the nasal mucous membrane.

What other names is it known by?

Coryza; cold in the head; acute nasal catarrh; and in children, the snuffles.

What is its etiology?

It is generally the result of exposure to cold and wet when the body is overheated. It may, however, be produced by breathing hot dry air or inhaling irritating vapors and dust, errors of diet, or come on apparently as the result of a venereal debauch. Scrofula, syphilis, rheumatism, dyspepsia, or a debilitated state of the system renders an individual more liable to attack.

What is its pathology?

At first the mucous membrane, though swollen and congested, is dry. As the disease progresses, there is an abundant serous discharge, which becomes more and more charged with broken-down epithelial cells, lymph-corpuscles, pus-globules, etc., until the discharge assumes the character of a thick, tenacious mucus or mucopus. The deeper lying tissues also participate in the process. The erectile tissue becomes gorged with blood, erected and swollen, in some instances completely occluding the nares.

What are its symptoms?

The onset may be simply an attack of sneezing, followed by increased and thickened discharges. In other cases the attack begins with chilly sensations and a general feeling of illness. There is a sensation of fullness and pain about the nose and forehead. The face may be flushed, the eyes suffused, and more or less fever be present. Sensations, almost suffocating in their character, may be present from occlusion of the nares, and the discharges be so irritating as to scald the skin of the alæ and upper lip. A cold in the head lasts from two or three days to as many weeks. It generally ends in complete resolution, but frequently repeated is a common source of chronic nasal catarrh.

What is the treatment of acute rhinitis?

A cold in the head can often be aborted at its commencement by a hot bath or a hot mustard foot-bath and a bowl of hot lemonade at bedtime, followed in the morning by a saline purge and the wearing of extra warm clothing. The turgescence of the nasal mucous membranes and discharges can always be abated by the application of a 4 per cent. solution of cocain. This effect of the cocain can be kept up for several hours by spraying the interior of the nose with a 4 per cent. solution of antipyrin immediately after the application of the cocain solution. The results thus obtained are more satisfactory than from the use of adrenalin, and the short duration of the attack prevents any danger of acquiring the cocain habit. A soothing snuff (Formula 24) used every two hours by the patient in the intervals between the applications adds much to the efficiency of the treatment. In severe cases the patient had better remain in bed, and the presence of fever requires the administration of aconite in small doses at frequent intervals.

SIMPLE CHRONIC RHINITIS.

What is simple chronic rhinitis?

Simple chronic rhinitis is a catarrhal inflammation of the nasal mucous membrane, exhibiting but a slight tendency to spontaneous recovery.

What other names is it known by?

Chronic catarrh; subacute rhinitis; chronic cold; chronic coryza; rhinorrhea.

What is its etiology?

It is generally the result of uncured acute rhinitis, or frequent attacks of coryza.

What is its pathology?

The mucous membrane of the nose presents precisely the appearance seen in acute rhinitis, only it is less swollen and less red in color. The discharge is either watery, if the upper parts of the nose, especially the mucous membrane of the middle tubinated bodies, are the parts most affected; or it approaches in character mucopus, if the disease is mostly located in the lower parts of the nose.

What are its symptoms?

The symptoms are precisely those of acute rhinitis, only less pronounced. There is a feeling of fulness about the nose, a continual discharge, and the sufferer is continually "catching cold," when, of course, all his symptoms are increased in severity.

What is its treatment?

Ordinarily the tone of the system is below par and a tonic is indicated. In such cases, Formula 37 answers a most useful purpose as a tonic; while, if the bowels are sluggish, it is advisable to direct the occasional use of a saline cathartic. *Cleanliness* of the mucous membrane is of primary importance, and may be secured by the patient using at home, twice a day, a bland alkaline antiseptic wash (Formula 1 or 2).

In using a nose-wash the patient should bend forward, and, closing one nostril with a finger of one hand, sniff up the solution from the hollow of the other hand, at the same time raising the head, so that the wash will gravitate into the pharynx and mouth, whence it may be expectorated, the process being repeated through the other nostril. Used in this manner, a much more thorough cleaning of the Schneiderian membrane may be accomplished by the solid stream of fluid drawn up through the nostril than if the spray of a hand-atomizer were employed. The patient may also effectually cleanse his nares by means of the *nasal douche*, but its use is sometimes suddenly followed by deafness, and it is, to say the least, a dangerous instrument. The frequent application of an *alterative* to the nasal mucous membrane also does good, and Formula 10 may be used for this purpose. The result of the application of this formula varies according to the amount of the solution used. When the nose is extremely sensitive, only a small amount of cotton should be wrapped about the applicator, so as to form a brush capable of absorbing but a small amount of the solution, which should be carefully applied to those portions of the nasal mucous membrane where the inflammation seems greatest; the cotton brush should also be passed along the floor of the nose and the application painted upon the pharyngeal mucous membrane. After the application of the iodin solution, the use of some protective upon the nasal mucous membrane is advisable. This indication may be secured by means of a spray of fluid cosmolin or albolin, applied until the mucous membrane of the nose and nasopharynx is thoroughly coated with it. The cosmolin serves the purpose also of "spreading" the application previously made, which, to all intents and purposes becomes, after the use of the cosmolin, an ointment thoroughly coating the Schneiderian membrane.

A case of simple chronic rhinitis is then perhaps best treated in the following manner: The patient is ordered a tonic, instructed to wash out his nose night and morning with either Formula 1 or 2, and to present himself at the physician's office at least twice a week, but better every other day, for treatment. After first cleansing the nose with a spray from an atomizer filled with either alkaline solution, the physician should make an application of the iodin solution, and follow it with a spray of fluid cosmolin or albolin.

What is its prognosis?

Untreated, chronic rhinitis may continue indefinitely, and finally result in hypertrophic rhinitis, the pharynx also gradually becoming affected. Treated in the manner described above, a cure is frequently brought about in from three to six weeks.

PURULENT RHINITIS.

What is purulent rhinitis?

Purulent rhinitis is an inflammation of the Schneiderian membrane in which the discharge from the beginning is purulent in character.

What is its etiology?

It probably always results from specific infection. It may occur during the course of one of the exanthemata, diphtheria, etc. A bacteriologic examination of the discharges should always be made to determine if possible the cause of the infection.

What is its pathology?

The bacteria characteristic of the infection are found in the discharges or in the mucous membrane. Pseudomembrane occurs from the presence of the Klebs-Löffler bacilli and other bacteria. Primary nasal diphtheria without systemic involvement, or at least systemic symptoms sufficiently severe to confine the patient to bed, is not a very uncommon disease. Under such circumstances the most noticeable symptom is complete occlusion of the nares by the swollen mucous membrane and pseudomembrane, a culture from which yields the characteristic bacillus of diphtheria. When the bacteria of purulent rhinitis are sufficiently virulent to cause actual destruction of tissue, deep ulcers occur, with final formation of scar-tissue. The disease is most common in childhood, and is probably the most common cause of atrophic rhinitis in after life.

What are the symptoms?

The disease is most common in children, and is characterized by a fetid, thin, purulent discharge, sometimes streaked with blood, which often excoriates the lip and alæ of the nose. The nasal mucous membrane is red, swollen, and ulcerated, and may or may not be partly covered by a pseudomembrane. The character of the bacteria found in the discharges varies greatly. Some cases occurring in young infants appear to be due to gonorrheal infection from the vagina during birth.

What is the treatment?

The nasal mucous membrane should be cleansed at least twice a day with an alkaline spray, and then covered with fluid petrolatum or albolin. Aristol or finely-powdered calomel should be used with a powder-blower two or three times a week, care being taken that none of the powder is blown through the nose into the pharynx, or constitutional effects will result.

In scrofulous children hygienic measures are often as important as local treatment. Cod-liver oil and syrup of the iodid of iron will be required in many instances. In primary nasal diphtheria, with pseudomembranes, these should be removed with forceps and peroxid of hydrogen, and the underlying mucous membrane painted with a 60 grain solution of nitrate of silver. The nasal mucous membrane should then be sprayed with menthol-camphor albolin, Formula 7, and the parts covered with calomel or some other reliable antiseptic powder. In many cases of pseudomembranous rhinitis, where the Klebs-Löffler bacillus is present, there is an entire absence of constitutional symptoms, and it often requires some persuasion to induce the parents to keep the child away from school. However, quarantine, at least to the extent of avoiding contact with other children, should be insisted upon. If the child is treated as an office or dispensary patient efficient precautions should be observed to avoid the spread of the infection. At home the nasal mucous membrane should be sprayed every two to four hours with 3 per cent. peroxid of hydrogen, and then with menthol-camphor albolin (Formula 7).

HYPERTROPHIC RHINITIS.

What is hypertrophic rhinitis?

Hypertrophic rhinitis is a chronic inflammation and hypertrophy of the nasal mucous membrane and submucous tissues, with permanent dilatation of the blood-vessels.

What other names is it known by?

Obstructive rhinitis; hypertrophic nasal catarrh.

What is its etiology?

It is invariably the result of long-continued simple chronic rhinitis or frequent attacks of coryza.

What is its pathology?

While in long-continued simple chronic rhinitis there is already some thickening of the epithelial layer of the mucous membrane, yet the disease only becomes hypertrophic rhinitis when the thickening involves the other elements of the mucous membrane and the submucous structures. As the result of frequent attacks of inflammation, infiltration occurs, which finally becomes organized, so that the thickened turbinated tissues cannot collapse as when normal, and remain permanently distended with blood. This thickening is most noticeable at the anterior and posterior parts of the middle turbinated bodies, where it is called an anterior or posterior hypertrophy. As the result of increased blood-supply, ecchondroses and exostoses frequently occur upon the septum opposite the pendulous portion of the inferior turbinated bodies, thus increasing the nasal obstruction. Often a "bank" or " ridge " of cartilage and bone will extend nearly the whole length of the septum from the anterior to the posterior nares.

What are its symptoms?

The most prominent symptoms are those of nasal obstruction, want of proper drainage from the nasal cavities, and thin secretions. When the obstruction is great and constant, the patient becomes a "mouth-breather." The inspired air, under such circumstances, not being properly warmed, moistened, and freed from dust, in its passage through the mouth, causes dry lips, a coated tongue, follicular pharyngitis, and sometimes chronic laryngitis. When the nasal occlusion is complete, the face assumes a stupid expression on account of the constantly open mouth. Should the habit of mouth-breathing be acquired in early childhood and continued for some years, even the shape of the bones of the face is altered and the habit of mouth-breathing retained long after the nasal obstruction has disappeared. In most cases of hypertrophic rhinitis any position favoring the gravitation of blood into the hypertrophied parts is sufficient to cause their distention; hence, when the patient is in bed, first one nostril and then the other will become occluded, according to which side of the body is lain upon. This is especially true when large posterior hypertrophies are present. Obstruction and suppuration of the nasal duct not unfrequently occurs, the pus flowing backward into the eye when pressure is made in the region of the inner canthus. An anterior hypertrophy of the middle turbinated body pressing on the septal nerve, which is a branch of the ophthalmic, frequently causes reflex eye-symptoms, such as chronic conjunctivitis, slight paresis of accommodation, and irritable retina. The olfactory slit may become closed from hypertrophy of the middle turbinated body, and thus interfere with the sense of smell and also that of taste to a corresponding degree. Hearing may be gravely compromised from the pressure of hypertrophies upon the Eustachian tubes, the damming up of their secretions, or the extension of the disease to their lining mucous membrane. Headaches are often complained of, and a feeling of pressure or even of pain at the root of the nose, as the result of occlusion of the infundibulum or even the extension of the disease into the frontal sinus. The drainage from the nose being interfered with, collections of mucus undergo fermentation upon the floor of the nose, thus increasing the inflammation and obstruction.

What is its treatment?

Each case should be treated as one of simple chronic rhinitis, until the inflammation of the Schneiderian membrane has disappeared, when operations should be undertaken for the removal of any tissue causing obstruction.

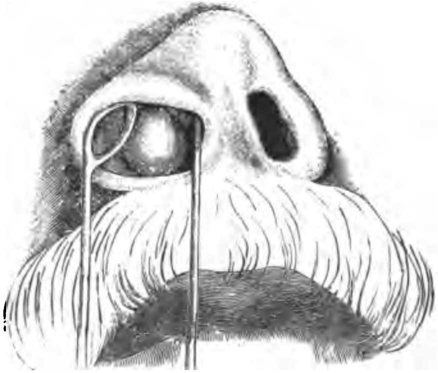

FIG. 44.—Nostril dilated by Bosworth's dilator, showing anterior hypertrophy (Seiler).

What operative procedures may be undertaken for the removal of anterior hypertrophies? (Fig. 44.)

If large, the operation with Jarvis' needles and snare (Figs. 45 and 46) will be found most satisfactory. Jarvis' snare consists of a small cannula, about seven inches long, made of steel. About four inches from the lower end is a cross-bar, and the portion between this and the end is threaded and carries a screw-nut, which, by being turned, travels up or down. A portion of the circumference of this threaded part of the cannula is filed flat throughout its entire length, and over it, behind the nut, slides a tube, which is fitted to the flattened screw so as to prevent its turning around, and carries on its lower end two retaining pins and a screw-cap, by means of which the ends of a wire loop are fastened. Thus it will be seen that by turning the nut the tube will be pushed downward, and the wire loop projecting from the distal end of the cannula thereby made smaller, until it is finally drawn within the cannula. The base of the hypertrophy should be transfixed with a needle, and the wire loop of the snare so placed that it surrounds the base of the hypertrophy beneath the needle. The loop being drawn tight, the milled nut of the instrument is turned slowly, until the wire loop has cut through the tissues. If the operation is done slowly, little or no hemorrhage results. Anterior hypertrophies of the middle turbinated body may be removed in the same manner, without, however, the use of a needle. Small anterior hypertrophies can be removed very satisfactorily by simply cutting through them with a sharp knife to the bone. This method is of advantage in children, where, as the result of eczema of the lip and alæ, and great inflammatory swelling of the skin and mucous membrane, it is difficult to do any other operation. If cocain be used, the cutting causes no pain, and may be repeated as often as the cut heals, until the eczema and hypertrophy have disappeared, which often occurs within a few weeks.

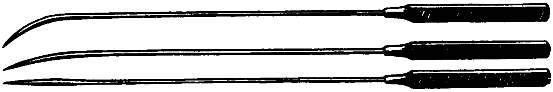

FIG. 45.—Jarvis' transfixing needles.

Anterior hypertrophies may also be destroyed by means of chemical caustics. These applications are, however, so unsatisfactory, in comparison with other measures at our disposal, that it is best not to employ them unless nothing better is obtainable at the time of the operation.

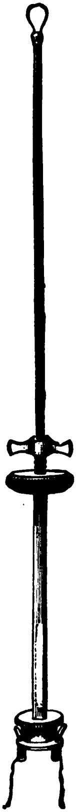

FIG. 46.—Jarvis' snare.

Perhaps the best method of removing anterior hypertrophies is by means of the galvanocautery. A pledget of absorbent cotton, saturated with a 4 per cent. solution of cocain, is introduced into the inferior meatus and allowed to remain in contact with the hypertrophy until it has shrunken as much as possible, and the parts are thoroughly anesthetized. A conical metal speculum is introduced after the removal of the cotton, and the hypertrophy exposed. After the platinum wire of the cautery-knife is at a dull-red heat, it is placed upon the thickest part of the hypertrophy, and by means of gentle to-and-fro movements is made to cut through to the bone, when it is carefully withdrawn, so as not to detach the eschar which it has formed. The operator should be careful to cut down to the periosteum before withdrawing his cautery-knife, or the results of the operation will be far from satisfactory; for, although a superficial burn either with the galvanocautery or chronic acid heals very quickly and gives a certain amount of relief for a short time, yet the results are by no means as permanent as when the cautery-knife is made to penetrate the tissues until the increased resistance indicates to the operator that the periosteum has been reached. The edge of the cautery-knife, and not its flat surface, should be applied to the hypertrophy, because the object is not to destroy the nasal mucous membrane, but to produce a firm and permanent eschar that shall anchor the mucous membrane to the bone beneath, and prevent the turbinated tissues from swelling with each "cold" to an extent sufficient to occlude the nasal chambers. The less mucous membrane destroyed the better. No after-treatment is required beyond keeping the wound as dry as possible, and endeavoring to avoid detaching the eschar before the healing process has been completed beneath it. Should, however, the eschar become detached, an antiseptic and astringent powder may be applied with advantage to the wound to form an artificial scab. The day following the operation there may be some inflammatory reaction, and the nostril occlude by swelling of the wounded hypertrophy, the patient feeling as if he had caught cold in that nostril; but this quickly subsides *if all catarrhal inflammation has been removed before the operation is undertaken.*

In what manner may the operation be done by means of chemical caustics?

Chromic acid is more frequently employed than any other chemical caustic in the treatment of anterior hypertrophies. It should be used in the following manner: The end of a silver or aluminum probe of a suitable size is heated and plunged into a bottle containing crystals of chromic acid, some of which will adhere to the probe and be withdrawn with it from the bottle. A further application of heat will fuse these crystals upon the probe, which is now ready for use. The probe may also be prepared for use as a cautery by wrapping a few fibers of absorbent cotton about its end and rubbing into it moist powdered crystals of chromic acid until the cotton is saturated with the paste.

The parts having been cocainized, the end of the probe covered with chromic acid is pressed firmly into the hypertrophy and pushed backward and forward over the line to be cauterized, and finally withdrawn. After the lapse of a few moments the nasal chamber is thoroughly washed with the spray from an atomizer containing an alkaline solution, care being taken that none of the resulting chromic salt reaches the pharynx and is swallowed, as it is poisonous.

Chromic acid is more uncertain in its action than the galvanocautery-knife. It is difficult to estimate the depth to which the cauterization will extend; and even though the mucous membrane is dried with absorbent cotton before its use, the acid is apt to spread over its surface and produce a somewhat superficial destruction of the mucous membrane by no means desirable. If the acid is allowed to reach the septum, large perforations sometimes occur. The cheapness of chemical caustics is their advantage in comparison with the use of the galvanocautery-knife.

What kind of a battery may be used in this operation?

Any galvanocautery battery that is capable of heating the platinum wire of the cautery-knife to a cherry-red heat will answer, but a good storage-battery is cheaper and cleaner and less liable to get out of order than any primary cautery battery. Portable storage-batteries can be obtained and may be charged from the wires of an electric light company, or from four or five cells of the ordinary sulphate-of-copper battery used in telegraphy. For office use, one cell of a Flemming portable storage-battery and four Watson sulphate-of-

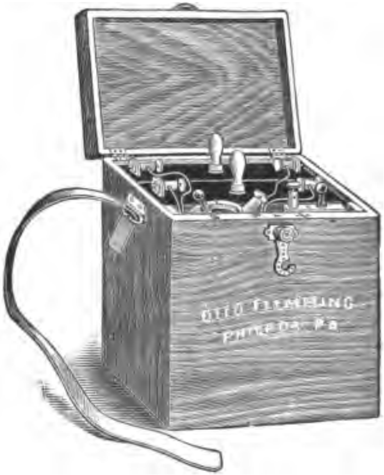

FIG. 47.—Flemming's storage-battery.

copper cells to charge it with electricity will be found an efficient and cleanly outfit (Fig. 47). However, such an outfit will hardly be sufficient for all purposes. Each cell of a storage-battery supplies $2\frac{2}{10}$ volts of tension, the quantity of electricity furnished being expressed in ampère hours. A cell furnishing fifty ampère hours will supply fifty ampères for one hour or one ampère for fifty hours. Other things being equal, the number of ampère hours depends upon the size of the cell; but the voltage or pressure of the current depends solely upon the number of cells, each cell supplying only $2\frac{2}{10}$ volts, regardless of its size.

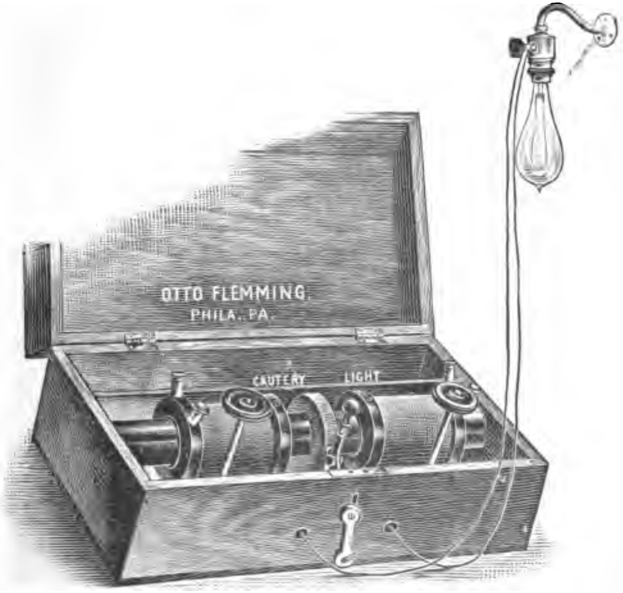

Fig. 48.—Electric converter.

Most of the miniature lamps made for purposes of transillumination in the diagnosis of diseases of the accessory sinuses require a pressure of three volts for a 1-candle lamp and four to six volts for lamps of 2- and 3-candle power.

The latter are the most useful for purposes of transillumination. For purposes of transillumination it is necessary, therefore, to provide a storage-battery of at least two cells, like that shown in Fig. 47.

For running an electric motor one large cell will suffice. However, the motor shown in Fig. 53 requires five volts of electric pressure, and hence three storage-cells. These cells also should be of considerable size, in order to furnish a sufficient *quantity* of electricity for running the motor during a long and tedious operation. However, electric motors are supplied that do efficient work with a two-volt current, and for such motors, galvanocautery-knives, and snares one large storage-cell is sufficient.

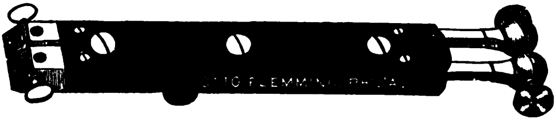

FIG. 49.—Galvanocautery handle.

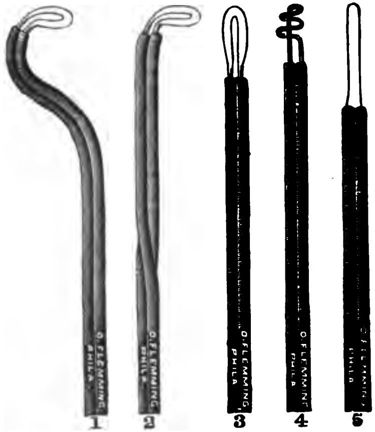

FIG. 50.—Cautery-knives.

When the rhinologist's office is lighted from the wires of an electric supply station some form of "converter" may be used to secure a current suitable for the galvanocautery, snare, miniature lamps, and electric motor. Apparatus also may be purchased for obtaining from the companies' wires both a suitable galvanic and faradic current for medicinal purposes. The converter shown in Fig. 48 is somewhat extensively used.

How may posterior hypertrophies be removed? (Fig. 51.)

A Jarvis snare should be threaded with a rather thick piece of imported steel piano wire (No. 5 or 6), so that the wire will have sufficient resistance not to bend away from the base of the hypertrophy after it has engaged the growth. The loop of wire should be bent to one side before being introduced into the nostril, so that it may the more readily be passed around the hypertrophy and remain in position when the loop is tightened. Being made as small as possible without distorting it by pulling down the sliding tube upon the handle of the instrument, the loop is carefully introduced along the floor of the nose until the posterior wall of the

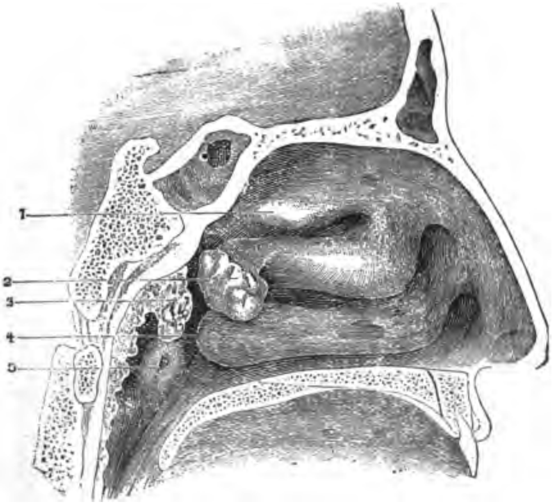

Fig. 51.—Posterior hypertrophy of the middle turbinated body.

pharynx is reached, when the loop is again enlarged by pushing upward the sliding tube, and the instrument at the same time is slowly withdrawn as its handle is carried toward the septum. By this means the wire is made to surround the hypertrophy, and a resistance is finally felt as the instrument is withdrawn, caused by the bight of the loop coming in contact with the base of the hypertrophy. The wire loop is now quickly tightened around the hypertrophy by pushing forward the instrument within the sliding tube, and the milled nut is quickly screwed downward into place. Two or three additional turns are given to the milled nut to be certain that the wire is tight about the base of the growth and that the instrument is held firmly in place without danger of slipping, when the patient may be allowed to rest. The sudden tightening of the wire loop occasions the patient some pain, which, however, soon subsides, when the loop may be still further tightened by turning the milled nut until the patient begins to again experience pain. In this way, proceeding slowly and carefully, the hypertrophy is finally squeezed off from its attachment, and is generally removed clinging to the end of the instrument by some fibers that have been drawn down into it with the wire. Should, however, the growth not be removed with the instrument, no attempt should be made to dislodge it from the nose, as it forms an efficient plug to prevent hemorrhage, and will probably drop into the fauces and be expectorated within twenty-four hours after the operation. From thirty minutes to two hours should be thus consumed in removing a posterior hypertrophy, in order to prevent severe hemorrhage, which from its situation might be difficult to control; and the patient should sit awhile in the doctor's office before proceding homeward, and should be cautioned against walking rapidly, violently blowing his nose, or hawking and spitting. Ordinarily there is a very little blood lost at the time of the operation, but for some days afterward the patient expectorates a blood-tinged mucus. Owing to the compression of the wire, the wound made by snaring a posterior hypertrophy is but small and generally heals rapidly. Where there are several posterior hypertrophies present in the nose, a second operation may be done a week after the first. If a posterior hypertrophy is very small and sessile, it may more easily be removed if the operator waits until his patient has caught cold, when the swollen growth is more readily grasped with the wire. It is recommended by some authorities to watch the movements of the wire in the rhinoscopic mirror during the process of snaring. This very much complicates the operation and adds to its difficulties, and is absolutely unnecessary, as a good operator has his sense of touch so well educated that he has, as it were, an eye at the end of his snare, and can readily feel when the wire loop has engaged the growth. Besides, it has been shown by Bosworth that any structure in the posterior nares that can be grasped by the snare is pathologic in its nature, and should be removed.

What are ecchondroses and exostoses of the septum?

A localized cartilaginous thickening or projection from the cartilaginous septum is called an ecchondrosis, while a similar bony growth upon the bony septum is referred to as an exostosis. This latter name should not be confused with osteoma, a name given to rather a rare form of bony nasal growth which springs from the cellular tissue beneath the mucous membrane, and is not continuous with the cartilaginous or bony framework of the nose, and is therefore movable. Frequently ridges or shelves of cartilage and bone are found extending along the septum nearly from the anterior to the posterior nares. Usually such growths are opposite the lower turbinated body and encroach upon the breathing space of the nose.

What is their etiology?

They are doubtless sometimes merely provisional callus, that has been deposited upon an old fracture of the septum and has escaped absorption. The fracture may have been received during early childhood as the result of one of the numerous "bumps upon the nose" that children are constantly receiving. Most frequently, however, such outgrowths are the result of a local perichondritis or periostitis caused by the presence and *intermittent* pressure of a hypertrophied turbinated body.

What symptoms do they cause?

Frequently nasal obstruction, sometimes with deviation of the septum toward the other nostril. Atrophy of the turbinated body opposite them is not uncommon, nor neuralgia of the whole side of the face as the result of internasal pressure. Sometimes the crest of such growths is ulcerated, and a thin, irritating, sanious discharge results, impossible to cure except by the removal of the exostosis or ecchondrosis. The nostril being obstructed in front, the breath current is interfered with in such a way that there is a constant rarefaction of the air at the orifice of the Eustachian tube, and tinnitus, and, finally, otitis media and deafness result.

What operations may be done for the removal of these growths?

Localized thickenings of the cartilaginous septum may be cut through and removed by means of a small knife slightly curved upon the flat. When the growth is hard and bony, it is best removed by means of a chisel or saw. The patient is prepared for operation by placing a piece of absorbent cotton saturated with a 4 per cent. solution of cocain within the nostril. The cocain should be allowed to remain in contact with the structures to be operated on for at least fifteen or twenty minutes that its anesthetic effects may penetrate as deeply as possible. The nostril is then sprayed with a 1:1000 solution of adrenalin to render the operation bloodless so far as possible. After the removal of the cotton, the parts to be operated upon should be exposed by means of the dilator (Fig. 22), which will be found very convenient for operations within the nose, because when once in position it is self-retaining and not easily displaced by the struggles of the patient during an operation. It is introduced by holding the instrument between the thumb and first finger with the concavity of its spring upward, when the closed blades are introduced along the floor of the nose until they have disappeared within the nostril. The spring of the speculum is now carried upward over the nose until the blades of the speculum have grasped and distended the rim of the nostril, when, if necessary, the spring of the instrument may be hooked to a head-band upon the patient's forehead, thus elevating the tip of the nose so as to secure the best possible exposure of the part to be operated upon. If a chisel is to be used, the patient's head is made to rest against a firm support, and the edge of the chisel is placed against the anterior portion of the exostosis and made to penetrate as deeply as possible by pushing it forward with the hand. If necessary, the operation is continued by hammering upon the handle of the chisel with a lead mallet until the growth is felt to be severed from its attachment to the septum. Ordinarily, after the use of the chisel, a few shreds of mucous membrane still bind the growth to the septum. These should be severed with angular scissors, and the exostosis withdrawn from the nostril by means of long-nozzled hemostatic forceps, or any other forceps that affords a firm hold without taking up too much room in the nostril. The advantage of the chisel operation is the quickness with which it can be performed; but after the first cut has been made, the nostril is deluged with blood and the operator has to complete the operation entirely by the sense of touch, being careful to hold his chisel, while hammering upon it, with its blade exactly parallel to the septum. The operation is brutal, and is almost invariably followed by syncope, as the result, perhaps, of the concussion of the brain caused by the blows of the mallet. When the exostosis is large the results are frequently unsatisfactory, a large jagged wound generally resulting from frequent applications of the chisel. The operation, if justifiable at all, is only so in cases where the exostosis is attached to the septum by so narrow a base that it may be severed by a single thrust, as it were, of the chisel or gouge.

When the saw (Figs. 57, 58) is used, it should be entered *below* the growth and the sawing done in an upward direction, so as to obscure the field of operation as little as possible by blood, which, of course, flows downward from the wound. When the shelf of bone is large and hard, the operation is necessarily tedious; but at any stage of the operation the saw may be withdrawn and both operator and patient rest, a plug of absorbent cotton saturated with a 4 per cent. solution of cocain being again inserted within the nostril. Under these circumstances the cocain acts as a hemostatic, and the probability is that the nostril will be found free from blood when the cotton is withdrawn, so that the operator can readily see to replace the saw in the cut already made. However, if necessary the nose may be sprayed with a 1:1000 solution of adrenalin from time to time during the operation. It is possible in some instances to secure a practically bloodless operation; but it should be borne in mind that adrenalin contracts only the more superficial vessels, and that if a large vessel is severed, especially one deeply imbedded in bone, the hemorrhage may be severe. Under such circumstances the operation should be completed as speedily as possible, and the severed mass of bone removed. The nostril should then be quickly "packed" with cones of absorbent cotton saturated with peroxide of hydrogen, as described in the chapter on nasal hemorrhage. It is well before undertaking any operation to have several cones of cotton prepared so as to be able to quickly control hemorrhage should it occur.

There are many varieties of nasal saws for sale in the instrument stores. That of Sajous (Fig. 57, A), Bucklin (Fig. 57, B), and those with teeth arranged like a metacarpal saw (Fig. 58) sever the bone more rapidly than the others, and hence are to be preferred when the mass of bone to be removed is large and hard.

Not infrequently, after the bone has been completely severed, it will be found difficult to cut with the saw the shreds of mucous membrane by which it is still attached to the septum. These shreds usually can be easily cut with the nasal scissors. However, in most instances the snare (Fig. 46) is by far the preferable instrument. The snare is especially useful in cases where a small exostosis has apparently been completely severed, but has disappeared from view in the blood within the nose. In some of these cases it is difficult to locate and grasp the mass with forceps, and impossible for the patient to blow it from the nostril because of a shred or two of uncut mucous membrane; under these circumstances if the wire loop of a snare is passed beyond the position of the exostosis and then kept closely in contact with the septum as it is withdrawn from the nose, the loop will hardly fail to encircle any shreds that still connect the exostosis to the septum, and after these are severed by closing the loop the exostosis usually is withdrawn from the nose with the snare by means of fibers that have been drawn into the tube of the snare.

Even when plainly seen, because of the conical shape of the anterior extremity of a severed exostosis, it is sometimes not easy to grasp with ordinary forceps. Under such circumstances Farnham's alligator-forceps usually affect a secure hold on the slippery mass.

The history of the development of these admirable instruments is a matter of some interest. Lauer of Paris was the inventor of an "alligator-forceps," which, like tube-forceps, could be used within a narrow canal without obstructing the view, and yet grasped firmly any object within its jaws. Farnham modified this instrument by having the jaws of the instrument cup-shaped, and his "curet-forceps" (Fig. 56) are capable, when sharp, of cutting soft bone and cartilage. They are well adapted for cutting through the pedicle of a polypus that cannot easily be grasped with a snare, and for general use either as cutting or grasping forceps within the deeper parts of the nasal chambers. Three sizes of this instrument should be owned by the rhinologist. This instrument, however, is not powerful enough to bite through masses of bone springing from the septum; while, from the shape of

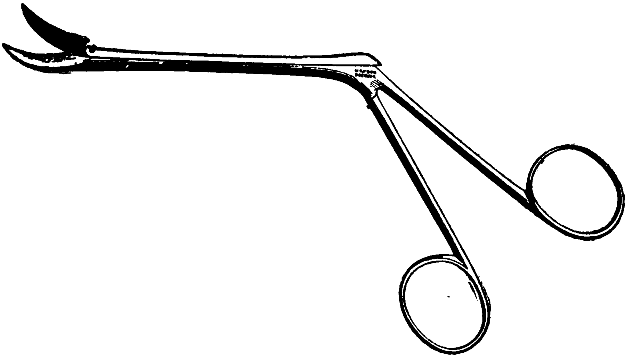

FIG 52.—Nasal scissors.

the cup-like jaws, both sides of the nasal chambers are liable to be grasped when the instrument is used within a narrow space. The heavier Frankel scissor-forceps are sufficiently powerful to sever masses of bone of considerable thickness. However, for clipping small masses of bone, cartilage, and soft tissues within the nose the Myles forceps (Fig. 68) is generally the preferable instrument.

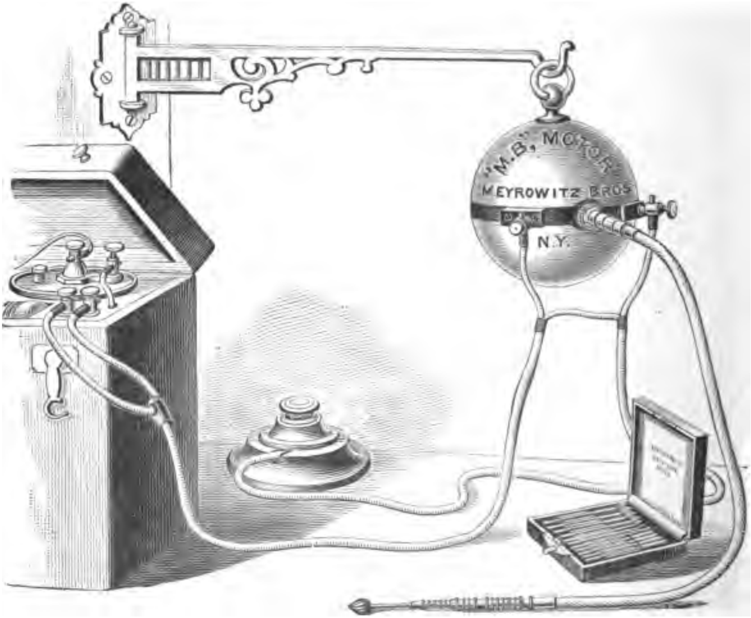

FIG. 53.—Electric motor.

How is the removal of exostosis accomplished by means of drills and trephines driven by an electric motor?

The motive power for the drill is supplied through a flexible armpiece (such as is used by dentists) by a small electromotor, suspended from a movable bracket attached to the wall, at one side of the patient's head (Fig. 53). Many of the drills and trephines offered for sale are rendered so clumsy by the shield designed to protect the parts about the field of operation from injury that the trephine and shield cannot be introduced more than one-half inch within the nostril without hiding everthing from view; while the instrument is too short to reach from the anterior to the posterior border of the septum (Fig. 54). There is, moreover, so much rattling of the trephine inside the shield as to interfere materially with the delicacy of the sense of touch through it. These faults are overcome by lengthening the shanks of trephines and burrs, and constructing the shield as shown in Fig. 55. So modified, the trephine seems to possess all the advantages of both chisel and saw for the removal of bony growths from the septum, and none of the disadvantages of either instrument. With it large exostoses may be removed as quickly as with a chisel without producing as great pain and shock, and hemorrhage does not hide the parts from view during the operation; so that it is possible to remove the entire exostosis and leave a wound as smooth and perfect as that resulting from the use of the saw. The modified shield is constructed of thin metal, and made to hug the shafts of the trephines and drills as closely as possible, so that that part of the instrument is so slender that it does not obscure the view when it is inside the nose; while, on account of the long bearing of the drill inside of the shield, it revolves so smoothly that the delicacy of the sense of touch is not impaired in the

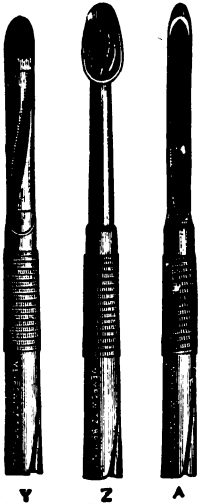

FIG. 54.—Electric-motor drills.

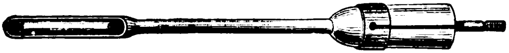

FIG. 55.—Electric-motor drill.

least, and it is entirely possible to use the end of the shield as a probe to test the hardness of any projection from the septum before cutting it with the trephine or burr. It is also possible to preserve flaps of mucous membrane from the lower and upper surfaces of an exostosis sufficiently large to cover the wound should it be thought desirable to do so.

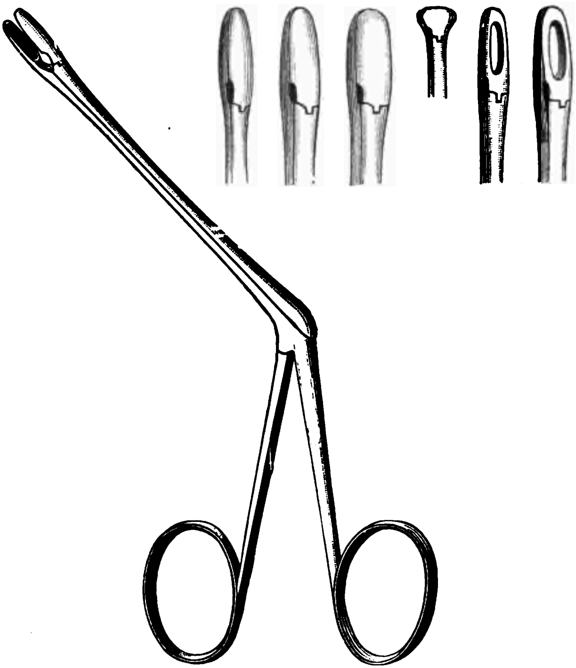

Fig. 56.—Farnham's nasal cutting forceps.

The operation with the drill is performed in the following manner: A trephine sufficiently large to remove at once the major portion of the exostosis is selected, and with its shield is adjusted to the armpiece of the electric motor in such a manner that the shield will protect all parts of the nose from injury except those to be cut away. The teeth of the trephine are now pressed into the anterior part of the growth, and as the instrument is pushed forward a piece of bone is cut from the exostosis, which enters the cavity of the trephine, where a knife set at an angle cuts it into pieces sufficiently small to pass through a fenestra made for this purpose. Should a sufficient amount of the growth not be removed by the first passage of the trephine through the nasal fossa, the trephine may be reapplied as often as may be necessary to remove the entire exostosis and leave a smooth, flat surface like that made by a saw.

When an ecchondrosis or exostosis has attached itself to the inferior turbinated bone, so that a synechia or "bridge" extends from the septum to the opposite side of the nostril, it is perhaps best removed by first sawing through the portion next the inferior turbinated body, then packing the nostril with absorbent cotton saturated with a 4 per cent. solution of cocain to check all hemorrhage, and, finally, either sawing or chiselling away the attachment to the septum. Unfortunately, after such an operation the "bridge" is very liable to recur, owing to the granulations from the cut surfaces of each side of the nostril approaching each other during the healing proc-

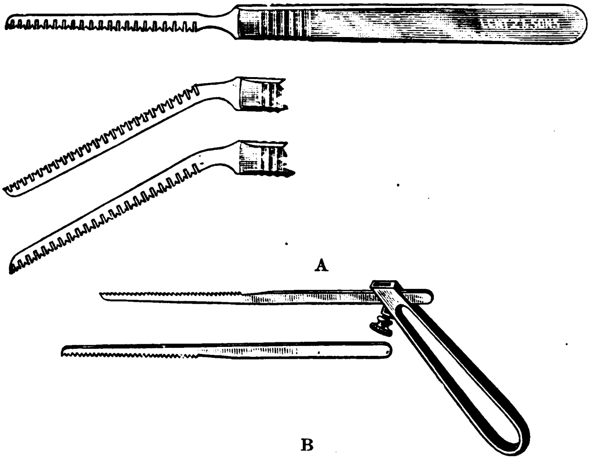

FIG. 57.—A, Sajous angular and straight nasal saws. B, Bucklin's reversible nasal saw.

ess, until they finally unite, forming a mass of granulation-tissue, which, contracting, at length produces a much worse condition of affairs than existed before the operation. To prevent this disaster, a steel probe may be used to break down the adhesions, or a piece of tin-foil or gutta-percha may be worn inside the nose between the cut surfaces until the healing process is complete. Ordinarily the operations for the removal of exostoses, either with saw or chisel, require no after-treatment beside the free use of an antiseptic wash (Formula 1 or 2) by the patient, in order to keep the wound clean. There is but little inflammatory reaction, and the wound heals promptly, especially *if all pre-existing nasal inflammation has been made to disappear before the operation was undertaken.*

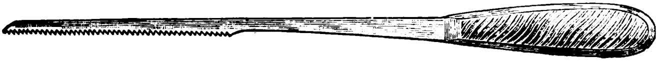

FIG. 58.—Bosworth's Nasal saw.

ATROPHIC RHINITIS.

What is atrophic rhinitis?

Atrophic rhinitis is an atrophic condition of the nasal mucous membrane, usually also of the submucous tissues; and occasionally of the turbinated bones and septum. The disease is characterized by the formation of scabs and crusts, which frequently emit a fetid and offensive odor.

What other names is it known by?

Dry catarrh; atrophic nasal catarrh; and, in children, scrofulous rhinitis.

What is its etiology?

Atrophic rhinitis is said to result from long-continued hypertrophic rhinitis. An abnormal dryness of the atmosphere, like that produced by hot-air heaters, abnormal patulency of the nares, or anything else that causes a rapid evaporation of the nasal secretions, tends to produce atrophic rhinitis. Bosworth stated that in many instances the disease begins in childhood as a purulent rhinitis. In such cases the thin discharge drying upon the turbinated bodies behaves very much as would a layer of contractile collodion. As the result of pressure, nutrition of the parts is interfered with to such a degree that not only atrophy of the mucous membrane, but also of the turbinated bones, occurs. However, any infection with bacteria virulent enough to cause destruction of the nasal mucous membrane over comparatively large areas will produce atrophic rhinitis. The writer has seen it occur in the adult as the result of syphilis, and probably the larger majority of cases are the result of the destruction caused by pseudomembranous rhinitis and nasal diphtheria.

What is its pathology?

When the disease is the result of long-continued hypertrophic rhinitis, the pressure of adventitious cellular tissue causes absortion of the glandular elements. The surface of the mucous membrane being thus nearly deprived of its secretions, is exposed to dust and irritants of every kind that accumulate upon it, and with long-retained and rotting semi-inspissated secretions, form bad-smelling scabs and crusts. Owing to pressure from these scabs, shallow ulcers occur beneath them, while the atrophy progresses until, in some cases, the turbinated bones have nearly disappeared and the septum has become, at certain parts, almost as thin as a sheet of writing paper. It is not uncommon for individuals to present themselves to the surgeon with hypertrophic catarrh existing in one nasal cavity, whilst atrophic rhinitis is present in the other. In such cases there is usually deviation of the septum toward the hypertrophic side. Cases are not infrequently seen with an inferior turbinated body and the adjacent mucous membrane atrophied, whilst the middle turbinated body immediately above is greatly hypertrophied, generally as the result of ethmoiditis.

Concomitant disease of the ethmoid cells or of some one or more of the other accessory sinuses of the nose is not uncommon in atrophic rhinitis, and it has been claimed that atrophic rhinitis may result from suppuration of one of the accessory sinuses. When superficial necrosis results from bacterial infection the progress of the disease, after the formation of ulcers, is similar to that described above. Retained secretions putrefy and produce a characteristic odor, horribly offensive, the disease being then termed ozena. Similar stenches occur in scrofulous children and in syphilitics, the stench resulting usually not from fetid semi-inspissated mucus but from sequestra of dead bone within the nose.

Somewhat numerous varieties of bacteria are found in the secretions of atrophic rhinitis. Those causing putrefaction and pus-formation naturally being the most numerous. Not very infrequently the Klebs-Löffler bacillus is found. However the bacillus, when it occurs under such circumstances, is said to possess but little virulence, but might, under favorable circumstances, become a cause of infection. From the characteristic odor of the secretions in atrophic rhinitis, it would seem probable that they might contain a characteristic bacteria, but such, as yet, has not been satisfactorily proven to be the case.

What are its symptoms?

A sensation of dryness and irritation within the nose and pharyngeal vault, with almost constant efforts to remove the accumulated secretions by hawking, spitting, and blowing the nose. The breath is usually offensive from the putrefactive changes taking place in the slowly drying secretions. The patient, because of his defective sense of smell, is usually unaware that his breath is horribly offensive. Upon inspection, the mucous membrane is found dry and glazed, with scabs and pus adhering to certain portions of it. Sometimes the nostrils are so patulous that the posterior pharyngeal wall can be plainly seen through them, and it also is usually in an atrophic condition. Reflex skin rashes and laryngitis are very common as the result of this affection.

What is its treatment?

The indications are to secure and maintain absolute cleanliness of the nasal mucous membrane, and replace, if possible, the atrophied parts. Cleanliness may be secured by the patient's use of an antiseptic wash. Formula 3 or 6 will answer very well for this purpose. It is often quite difficult at first to detach the scabs and inspissated secretions that adhere like so much glue to the vault of the pharynx and posterior nares. In such cases the postnasal syringe answers a very useful purpose. The nozzle of the syringe is introduced behind the velum palati, and the stream of fluid thrown with considerable force into the vault of the pharynx and posterior nares. Nitrate of silver seems to have an especial action in increasing the vascularity of the mucous membrane, increasing its secretions, and in producing renewed growth of atrophied tissues. Formula 15 may be employed with the powder-blower for this purpose. Should a thorough application of the powder not be followed by momentary smarting, it does not contain a sufficiently large proportion of the silver, and Formula 16 will yield better results. A snuff containing a small proportion of argentic nitrate (argenti nitratis, gr. ij ; zinci stearatis, ʒiij) may also be ordered for the patient to use himself at bedtime, but the powders containing the larger proportion of silver nitrate should only be employed by the physician himself, and should not be strong enough to cause more than a momentary smarting. Better results sometimes follow massage of the interior of the nose with a cotton-tipped probe, either by hand or by the aid of one of the numerous massage machines.

Most excellent results follow applications of lignol, an oily substance obtained by the distillation of a lignite (Formula 43). Diluted with an equal amount of olive oil or albolin it is said to possess antiseptic qualities equivalent to a 1:1000 solution of bichlorid of mercury. Properly diluted, lignol is not irritating to the nasal or pharyngeal mucous membranes. It should be liberally painted over the diseased areas both of the nose and pharynx by means of an applicator tipped with cotton. The application of lignol diluted with an equal amount of olive oil is followed by smarting sensations that last for some minutes. The patient's handkerchiefs are not stained indelibly as when powders containing nitrate of silver are employed.

The best results are obtained in the treatment of atrophic rhinitis by the use of cylinders of absorbent cotton, as first advocated by Gottstein, so placed inside the nose as to take the place to a certain extent of the atrophied turbinated bodies. If pharyngitis sicca is present, the cotton cylinders should be of sufficient length to extend the entire length of the nasal floor and project somewhat from the posterior nares. The presence of the cotton cylinders excites the atrophied mucous membrane to renewed action, so that the dried secretions are washed away in the increased discharge, and the fetor of the breath corrected. The cotton cylinders soon become soaked with mucus, so that the air passing around them is warmed, moistened, and freed from dust, and enters the pharynx and larynx as if it had passed through a healthy nose. A cotton cylinder is easily made by wrapping absorbent cotton about the smooth wire shank of the laryngeal or rhinoscopic mirror until it has assumed the desired bulk and shape, when it may be slipped off the wire and deposited inside the nose. The patient should be taught how to make and place these cotton cylinders inside his nose, and should insert fresh ones as soon as the old are removed by the use of the handkerchief. If worn constantly they cause an immediate change for the better in all the symptoms of atrophic rhinitis, and greatly stimulate the renewed growth of the atrophied tissues.

A case of atrophic rhinitis is then best treated in the following manner: at the first visit the nasopharyngeal mucous membrane is thoroughly cleansed, and all scabs and adherent mucus removed, the postnasal syringe and forceps being, if necessary, used for this purpose. Formula 15 or 16 is then thrown upon the clean mucous membrane with the powder-blower, and cylinders of cotton placed in position inside the nose. The patient is ordered a wash and snuff for home use, is shown how to make and place the cotton cylinders, and requested to present himself at the physician's office, for inspection and treatment, at least twice a week. If pharyngitis sicca and reflex laryngeal symptoms are very annoying, small doses of iodid of potash (gr. ij–x, t. i. d.) may also be ordered with advantage to increase the secretions and diminish reflex action.

What is the prognosis?

Atrophic rhinitis is one of the most unsatisfactory and tedious of nasal diseases to treat. Fetor of the breath, and the other more annoying of the patient's symptoms are easily and quickly corrected in the majority of cases, and something very like a cure of the disease, although delayed, will be finally brought about by persistent effort, provided the simple atrophy of the glandular elements, both as to size and number, has not been followed by complete degeneration, that is, their conversion into some other form of tissue.

CORYZA VASOMOTORIA PERIODICA.

What is coryza vasomotoria periodica?

Coryza vasomotoria periodica is a chronic nasal affection depending upon a greater or less disturbance of the entire nervous system, and particularly of the various nerves supplying the nasal mucous membranes, and characterized by periodic exacerbations caused by inhaling dust or other irritants.

What other names is it known by?

Hay-fever, hay-asthma, autumnal catarrh, rose cold, horse cold, cow cold, peach cold, snow cold, miller's cold, or asthma, are names given to the affection and supposed to indicate the irritant which is the direct cause of an attack of the disease.

What is its etiology?

There are really three factors in the causation of an attack of hay-fever, viz.: First, a pathologic condition of the nasal chambers; this may comprise anterior or posterior hypertrophies, exostoses, ethmoiditis; but more especially the presence of hypersensitive areas, readily distinguished by their heightened color and slight elevation above the surrounding mucous membrane. Irritation of one of these spots with the end of a probe, even during the winter time, will bring on an attack of hay-fever lasting from half an hour to several days; second, a diseased, or at least an irritable condition of certain nerve-centers, giving rise to a train of near and remote symptoms by reflex action; third, the presence of an external irritant. *The absence of any one of these factors is sufficient to prevent an attack.*

What are its symptoms?

The premonitory symptoms of an attack of vasomotor coryza are those of coryza—a sense of dryness and itching in the nose, violent sneezing, occlusion of the nares, and profuse watery discharge. These symptoms are usually followed by conjunctivitis, lacrimation, photophobia, headache—often of a neuralgic character—a hacking cough, asthma, and a general feeling of malaise.

What is its treatment?

The most effective treatment of periodical hyperesthetic rhinitis is a sea-voyage, lasting through the entire hay-fever season or residence in a region free from the presence of irritating pollens and dust, like that of the White Mountains of New Hampshire.

For professional and business men, however, such a treatment involves hardships and loss of business opportunities that render it acceptable only as a last resort. Therefore any treatment that will enable the sufferer to remain at home in comparative comfort and attend to business is eagerly sought by the majority of workers suffering from hay-fever.

Somewhat recently the attention of the profession, chiefly through the writings of Seth Scott Bishop of Chicago, has been directed to the fact that the neurotic condition of the patient and the hypersensitiveness of the nasal passages were often due to an excess of uric acid in the blood, and that this excess could be eliminated by the ingestion of mineral acids. Bishop at first prescribed dilute sulphuric acid and later on Horsford's Acid Phosphate in one-half to teaspoonful doses in a tumbler of water morning and night. His results were most satisfactory. However, Bishop emphasizes the danger of an accumulation of uric acid in the tissues by rendering the blood too acid to dissolve it, thus precipitating an attack of rheumatism, or some other manifestation of uricacidemia. When possible he prepares his hay-fever patients who have the uric-acid diathesis for the hay-fever season by a course of lithia or the salicylates, extending over two weeks or even a month or more, in order to eliminate any excess of uric acid from the system. During the hay-fever season he relies largely upon lithia, and only uses the acid treatment to quickly relieve the patients' more distressing symptoms.

Probably any mineral acid would prove efficacious, but there are two which suggest themselves as peculiarly efficacious: hydrobromic acid, because of its sedative qualities, and nitromuriatic acid, because it is thought to limit the production of uric acid.

The writer's experience has been limited to the effects of nitromuriatic acid, which for the past three years has been prescribed in doses of 3 to 5 drops of the freshly prepared concentrated acid after meals and sometimes also at night. The dose should be diluted with a tumbler half full of water, and the patient, after taking the medicine, should rinse out his mouth and swallow another half-tumblerful of water.

The results of the remedy are apparent within forty-eight hours, and the relief of all hay-fever symptoms are usually sufficient to enable the patient to remain at home and attend to his ordinary business engagements in comparative comfort. If, however, a simple dose is omitted, some symptoms of hay-fever will appear within the succeeding twenty-four hours. This is especially true if the remedy is not taken after the evening meal, as, under such circumstances, the patient usually wakes up the next morning with occluded nares and suffused eyes.

Between the attacks of hay-fever measures should be adopted to improve the patient's general health and correct any abnormality of the interior of his nose. The practitioner, however, should not be too sanguine as to the beneficial results to be obtained by such measures, for it should be borne in mind that hay-fever not infrequently occurs in vigorous individuals the interior of whose noses present no gross abnormality, except during the hay-fever season.

There is, however, one condition of the nose that is apparently present in all individuals suffering from hay-fever, and that is the presence of hyperesthetic areas upon the respiratory portion of the nasal mucous membrane, which when touched with a probe cause sneezing and lacrimation.

The hypersensitive condition of such areas may be destroyed one or two at a time, even during the hay-fever season, without adding to the discomfort of the patient, by either palliative or radical methods.

The palliative method consists of cocainizing the nose and touching the sensitive area with a 10 per cent. solution of chromic acid applied by means of a cotton-tipped probe. The radical method consists in destroying the sensitive area by means of the galvanocautery. A small cautery-knife should be selected, and the current should be sufficiently strong to instantly bring its tip to a white heat. After cocainizing the nose, the cautery tip is moved over the mucous membrane until a sensitive area is discovered. The current is then turned on for an instant and the cautery-knife withdrawn. Very little destruction of the membrane results, and should hemorrhage occur no undue haste should be used in controlling it, as the local depletion is beneficial rather than otherwise.

Temporary relief may be obtained during the worse stages of the attack by spraying the nose with a weak alkaline 1 per cent. solution of cocain, and afterward with fluid vaselin as a protective. However, because of the *poisonous* effects of cocain in susceptible individuals, and more especially because of the danger of causing the cocain habit, the use of cocain, except by the physician as a local application to the patient's nose, has been practically abandoned. Its local application to the interior of the nose usually results in the control of all nasal symptoms of the disease for the time being, but is followed by a reaction which is very noticeable after the drug has been used for a few days. The same remark also applies to adrenalin. Almost complete relief from symptoms is obtained by spraying the nose every two or three hours with a 1:10,000 solution, followed after an interval by spraying the parts with menthol-camphor albolin; but after a few days the nose becomes very sensitive and the results are by no means as satisfactory as at first. The solution of adrenalin should be freshly prepared and not used of a greater strength than 1 : 10,000.

After the attack has subsided, all pathologic conditions of the nose should be removed, and the sensitive areas cauterized with a small galvanocautery-knife, so introduced that its flat surface will rest upon the sensitive areas and make a *superficial* burn.

What is the prognosis?

It is not unfavorable. The patient should be kept under observation and occasionally treated for at least three years after an apparent cure to prevent the danger of a relapse.

NASAL HYDRORRHEA.

What is nasal hydrorrhea?

Nasal hydrorrhea is a disease characterized by a clear watery discharge from one or both nostrils as the result of some irritation or disturbance, either peripheral or central, of the vasomotor supply of the nasal mucous membrane or of that from the trifacial nerves.

What is the etiology?

In one class of cases the flow of fluid from the nose is perfectly passive and causes no inflammation. The phenomenon is probably due in such cases to a paresis of the nasal branches of the trifacial nerve, which exercises an inhibitory action upon the normal exosmosis of serum in the nasal mucous membrane. In a certain number of these cases the fluid discharged has been claimed to be cerebrospinal fluid; by some pathologic process, a communication having been established between the nose and the subarachnoid space.

In a second class of cases the flow of serum is accompanied by great congestion and swelling of the Schneiderian membrane, and the phenomena are the result of an irritation of the vasomotor nerves. In this second class of cases the congestion and inflammation of the nasal mucous membrane and the consequent watery discharge are greatly increased by cold and by inhaling dust and other irritants. Indeed, the symptoms are somewhat similar to those of hay-fever.

What are the symptoms?

In the first class of cases there is an almost constant dropping of a clear watery fluid from one or both nostrils. In the second class of cases the discharge is more remittent in character, according to the amount of irritation of the Schneiderian membrane.

What is the treatment?

In some cases adrenalin acts as a specific.

As the cause of this disease is generally somewhat obscure, the treatment is necessarily expectant. The discharge terminates in some instances as abruptly as it began, almost without medication. Probably atropin is the drug most generally useful. It may be given internally (Formula 36) or, better, locally by means of an atomizer (Formula 40). The application of a 4 per cent. solution of cocain (Formula 9) invariably gives relief, and sometimes astringent powders (Formula 24) may be prescribed advantageously.

NASAL HEMORRHAGE.

What other names are there for nasal hemorrhage?

Epistaxis; rhinorrhagia; nose-bleed; hemorrhagia narium.

What is its etiology?

It is an old saying that recurrent hemorrhage from the nose is a warning, a remedy, and a disease.

The bleeding may be the result of some disease of the blood, of which the most common are plethora, anemia, hemophilia, and the condition of the blood brought about by typhoid and the eruptive fevers. Disease of the blood-vessels, the result of atheroma or syphilis, are predisposing causes, while the increased blood-pressure resulting from Bright's disease and organic disease of the liver, heart, lungs, or kidneys, are frequently early manifested by bleeding from the nose. Recurrent nose-bleed has hence been occasionally arrested by applying a blister over the liver, and in all cases the possibility of disease of some vital organ should be investigated and, if necessary, the proper remedy applied as a part of the treatment of nose-bleed, which in such instances is not only a warning, but to a certain extent a remedy from impending apoplexy.

No good observer probably has failed to be impressed with the very evident correlation existing in most of our domestic animals between the nose and the sexual organs, exhibited during the rutting season. Similar phenomena occasionally are observed in the human race, and many amusing stories are told in illustration.

Erectile tissue occurs in but three portions of the human body; the nose and throat, the nipples, and the sexual organs. In the male puberty is accompanied by a change of voice, and nose-bleed is not uncommon at this time in either sex; in the female, sometimes as a vicarious menstruation. Recurrent nose-bleed is said to be aggravated by masturbation.

Ulcerations and neoplastic growths within the nose are sometimes hemorrhagic. Angiomata, carcinomata, sarcomata, and especially fibromata frequently bleed at the slightest touch. Severe and repeated nasal hemorrhage, when it occurs in a youth with a nasopharyngeal fibroma, is almost diagnostic of the latter.

Traumatism is a frequent cause of hemorrhagia narium. If the blood flows from each side of the nose in equal amounts, it is somewhat suggestive of injury to the vault of the pharynx or even fracture of the base of the skull; because hemorrhage from injury to the nose alone is usually unilateral. However, blood from the nose may be swallowed or drawn into the bronchi and afterward coughed up or vomited in a manner suggestive of a pneumonic or stomachic origin of the hemorrhage. It is not always easy to make a diagnosis between bleeding from the vault of the pharynx and hemoptysis.

The nasal vessels are not supported by a muscular cushion into which they may be crushed by a blow, but lie in more or less intimate contact with bone or cartilage and are only protected by extremely delicate mucous membrane, and hence a slight injury is sufficient to cause hemorrhage, which is profuse and long continued, because the proximity of bone or cartilage prevents the ends of the severed vessel from contracting as readily as if they were imbedded in soft tissue. When sawing exostoses from the septum, an artery within the bone is occasionally encountered; and because the end of the vessel is held wide open by its attachments to the bone, hemorrhage is invariably profuse and long continued. Such cases invariably require radical measures to control the flow. Fortunately, however, arteries within such growths are comparatively rare. The prognosis of all forms of nasal hemorrhage is generally favorable, but few fatal cases having been reported.

What is its pathology?

The great vascularity of the nasal mucous membrane readily explains the great frequency of nasal hemorrhage. In most cases of spontaneous origin, the bleeding is from the neighborhood of the septal artery, *i. e.*, from the anterior part of the septum. Wounds resulting from surgical operations upon this portion of the nose frequently bleed profusely, although an artery is sometimes observed to "spurt" in the wound of an operation done further back upon the septum, while spontaneous bleeding may occur from posterior hypertrophies or adenoid vegetations. In such cases the blood flowing downward into the fauces is expectorated, and is frequently mistaken for a hemorrhage from the lungs.

How can nasal hemorrhage be controlled?

If after an operation severe hemorrhage has occurred, and it is known from what spot the bleeding occurs, a small mass of absorbent cotton or "spunk," such as is used by dentists, may be tightly wedged within the nose over the bleeding vessel and by its pressure secure the desired result, or a cone of spunk may be passed along the inferior meatus until it has wedged itself over the bleeding vessel.

Bleeding may occur from any portion of the nose, but it is most common from the anterior portion of the septum. In cases of recurrent nose-bleed, if the alæ be pulled to one side within a day or two after an attack, a small clot, a yellow spot, or a varicose condition of the veins upon the septum will mark the seat of the hemorrhage. Under such circumstances the patient should be directed to apply daily, by means of a brush, an ointment of gallic acid of the strength of 10 grains to the ounce of vaselin, and to avoid violently blowing the nose. Should the vessels be very numerous and varicose, this treatment will hardly suffice, and it will be necessary to destroy the vessels by a touch of the galvanocautery or chromic acid. It is not well to apply the galvanocautery or chromic acid too vigorously, as the cartilage of the septum has not much vitality, and too vigorous application of the acid may result in a perforation. The after-treament consists in the application of a 1 per cent. ointment of carbolic acid in cosmolin. This should be smeared over the parts every three or four hours with the finger-tips.

Occasionally recurrent nose-bleed is the result of a small ulceration or erosion of the mucous membrane of the anterior portion of the septum, generally in a hollow caused by a slight deviation of the septum or a cartilaginous spur or outgrowth within the nose. Because of the hollow upon the septal wall, mucus dries until the bulk becomes sufficient to extend above the hollow into the air-current, when it is dislodged by violently blowing the nose or by sneezing. Under such circumstances, a minute portion of mucous membrane is carried away with the inspissated mucus and a hemorrhage occurs. Sometimes the hemorrhage occurs from dislodging such masses of mucus with the finger-nail. The patient should be cautioned against picking his nose, as under such circumstances the resulting ulceration becomes deeper, until finally it extends entirely through the septum, and a perforation results.

Generally, the formation of crusts and scabs can be prevented by frequent applications of carbolized cosmolin, but should this not suffice, the hollow in the septum must be eradicated by suitable operative procedure—sawing off the spur or correcting the deflection, as circumstances require. The usually slight bleeding from anterior ulcerations, as it occurs from time to time, can be controlled by grasping the tip of the nose firmly between the thumb and finger, or the insertion of a small piece of ice within the naris.

This brings us to the consideration of the control of severe nasal hemorrhage. Under such circumstances, usually the patient is found bending over a bowl upon his lap or he may be resting upon the bed in such a position that his head leans over its side so as to allow the blood to drip into a receptacle upon the floor. Have him at once sit erect, propped up with pillows, if necessary, with his head neither thrown back or forward, and instruct him to hold a finger-bowl under his *chin* (not nose) to catch the flow of blood.

This change of position takes off pressure from the veins in the neck and may be all that is necessary to stop the hemorrhage. If this be the case, a little pledget of absorbent cotton, saturated with vaselin, should loosely be inserted within the naris to support the clot and prevent the patient breathing through that side of the nose.

If in spite of the change of the patient's posture the blood should continue to flow, it will be necessary to apply pressure to the bleeding vessel. This is most expeditiously, painlessly, and effectually accomplished by adding peroxid of hydrogen to the clot within the nose, which hardens it and causes an increase of many times its original bulk. Wrap a piece of absorbent cotton loosely about an Allen's probe so that it forms a cone three inches in length and one inch in diameter at its proximal extremity. Thrust this, dripping with peroxid of hydrogen, along the floor of the nose until the pharynx is reached. Place the forefinger-tip against the cotton within the nose and withdraw the probe, leaving the cotton in position supported by the finger-tip until the pressure caused by the ebullition of gas has somewhat subsided, then withdraw the finger and support the first pledget by means of a second plug of cotton saturated with peroxid of hydrogen. This is pressed somewhat firmly into the naris, especial care being taken that it firmly fills the space within the extreme tip of the nose, or blood will escape over the cotton plug.

When everything is ready, the whole maneuver can be executed in less than one minute, and the bleeding is instantly checked. If, after a minute or two, the fraction of a drop of blood shows itself oozing through the cotton, it should be coagulated by touching it lightly with Monsell's solution, and the process repeated from time to time, if necessary. It is well, indeed, to smear the whole of the presenting surface of the cotton with either the solution or salt of the perchlorid of iron, which dries with a little blood into a black impenetrable varnish, and allows no blood to trickle. Never apply any of the iron salts *inside* the nose to control hemorrhage, as they are extremely irritating and form a sort of sticky black sand exceedingly difficult to remove.

It should be remembered that it is not the peroxid nor the pressure of the cotton, but the pressure of the firm clot which forms within and about the cotton that checks the hemorrhage; therefore the cotton should be wrapped about the probe with only sufficient firmness to enable it to retain its conical shape when passed along the floor of the nose. Within certain limits, the more loosely the cotton is wrapped, the more peroxid it will take up and the more readily blood will enter its meshes. The conical shape of the mass facilitates its passage through the posterior naris, which, with the aid of a clot, it firmly closes. This method of controlling nasal hemorrhage is much less irritating than most others employed; but at the end of five or six hours swelling of the mucous membrane wiil have occurred to a sufficient degree to render the packing within the nose somewhat uncomfortable, and it is generally advisable and safe to remove the outer plug. This should be done with extreme gentleness, avoiding any sudden pull or jerk. At the end of twelve or twenty-four hours the larger mass of cotton can often be removed with safety if done in a proper manner. Avoid removing pressure too suddenly or the hemorrhage will certainly recur and the packing will have to be replaced. It is well to have at hand a smaller cone of cotton saturated with peroxid to instantly replace that removed should this accident occur. Grasp the end of the mass of cotton to be removed with a pair of dressing-forceps and draw it forward the eighth of an inch, then wait five minutes. Repeat this procedure at intervals of five minutes until the mass is coaxed, as it were, from the nose. If, during this process, a drop of blood shows itself, cut off with a pair of bandage-scissors that portion of the cotton already outside of the nose and press into the vestibule a little mass of fresh cotton saturated with peroxid. Be content to wait for an hour or so before again trying to remove the packing; for at any rate you have diminished the pressure within the nose, and rendered your patient more comfortable. If, however, you have succeeded in removing the whole of the cotton without the hemorrhage recurring, place a little cotton in the vestibule of the naris and allow your patient to rest for a half-hour or so before permitting him to blow out the clot—which should be done with great gentleness. It is necessary in all cases to remove the packing from the nose at the end of forty-eight hours, as by that time it will be extremely foul smelling and there is danger of sepsis. If necessary to check the recurrent hemorrhage, the nose can be packed again with cotton saturated either with peroxid or cosmolin, which, next to peroxid, is probably the best hemostatic for use within the nose.

In most works on surgery an instrument called Bellocq's cannula is figured, by means of which the posterior nares may be plugged by drawing a mass of cotton or other material through the mouth behind the soft palate; if at hand, this instrument may be used. A simpler plan is to insert a Eustachian catheter through the nose and pass a fiddle-string or well-waxed piece of stiff twine through it until its end appears in the fauces, when it may be seized by a pair of forceps and drawn out through the mouth. A piece of absorbent cotton should then be tied to the middle of the fiddle-string or waxed cord, and drawn up behind the palate into the vault of the pharynx in such a manner that one end of the string projects from the nose and the other from the mouth. The ends of the string may now be tied together so that the cotton plug is firmly held in position. This procedure is seldom, if ever, necessary to check hemorrhage from the nose, but may be used, where ether is administered, to prevent blood flowing into the pharynx during an operation upon the interior of the nose.

In hemophilia, after the nose has been packed with absorbent cotton and peroxid, 10 grains of gallic acid or 20 drops of fluidextract of ergot may be given every two hours. Very satisfactory results follow the use of chlorid of calcium, 5 to 10 grains every two hours may be given in capsule or dissolved in a little water. Some authors emphasize the importance of large doses, and as much as 40 grains has been given once daily by the mouth or rectum.

Recently Merck has introduced a new remedy for the control of hemorrhage called stypticin, said to be cotarnine hydrochlorate. A useful formula in nose-bleed is:

℞ Stypticin,	gr. xxiv;
Fluidext. ergotæ,	fʒvj;
Vin ergotæ,	q. s. ad. f℥ij.—M.

Sig. Of which a teaspoonful every two or three hours may be given until the hemorrhage ceases.

DISEASES OF THE ACCESSORY SINUSES OF THE NOSE.

What cavities found in certain bones of the skull communicate with the nasal chambers?

The antra of Highmore, or the maxillary sinuses; the anterior, middle, and posterior ethmoid cells; the sphenoid cells; and the frontal sinuses.

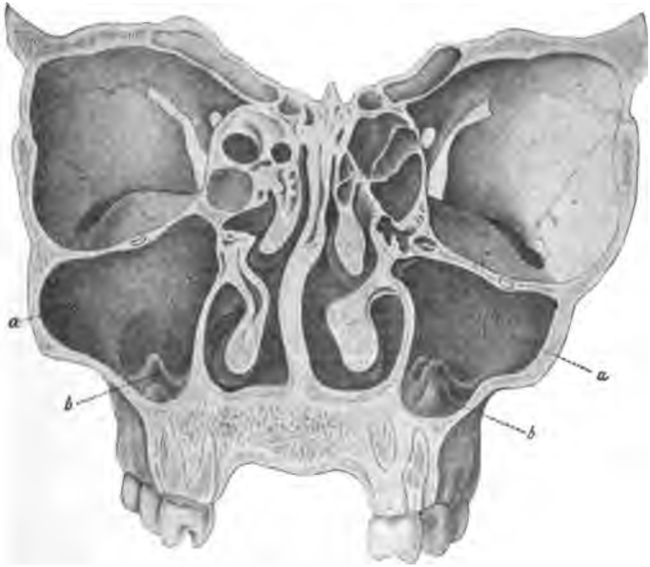

FIG 59.—Transverse section of the maxillary sinuses (Zuckerkandl).

What is the most common disease of the antrum of Highmore?

Catarrhal inflammation of its lining mucous membrane, which, as is usual in closed cavities, soon degenerates into purulent disease, the pus finding its exit through the ostium maxillare and escaping into the nose.

What is the etiology of the disease?

The fangs of the first and second molar teeth usually extend into the floor of the antrum, the apex of the fangs not unfrequently reaching a level above that of the rest of the antrum (Fig. 59). Under these circumstances it is easy to understand how caries of these molar teeth would result in suppuration of the antrum. The commonest cause, however, of antrum disease is closure of the ostium maxillare as the result of hypertrophic rhinitis and polypoid degeneration of the mucous membrane about this opening. Some acute cases can be traced directly to the effects of taking cold. The antrum may be infected from diseased molars, diseases of the ethmoid cells of the frontal sinuses, of the sphenoidal sinuses, syphilitic necrosis, etc.

What is the pathology?

Soon after the onset of the disease the mucous membrane becomes greatly swollen and edematous, and a large amount of seromucus is poured out. The disease may gradually subside at this stage, or the secretion may become purulent. The deeper layer of the mucous membrane, which in this locality is the periosteum, also partakes of the inflammation, and exostoses are formed, which in the form of spicules or lamina of bone may project into the antrum in such a manner as to divide it into two or more small chambers.

What are the symptoms of purulent disease of the antrum?

At the beginning of the attack there is a sense of fulness and pressure beneath the orbit, and pain, sometimes agonizing in character and involving the whole side of the face. Mastication is generally painful, the teeth of the affected side feeling as if elongated and crowded out of their sockets. The symptoms are due to a collection of fluid within the antrum and closure of the ostium maxillare, and may last for several days, when the fluid is either evacuated through the ostium maxillare or by an opening through the thin lateral wall, the alveolus, the cheek, or the orbit. After this spontaneous evacuation the pus flows for a length of time, the course of the disease being marked by periods of retention, during which there is more or less pain, terminating by a discharge of somewhat fetid pus from the nostril.

Some cases, however, pursue a chronic course from the commencement, there being at no time complete closure of the ostium maxillare and retention.

In all cases of disease of the antrum the discharge is somewhat periodic in character, certain positions of the head favoring the escape of fluid from the antrum. In long-continued disease of the antrum the roots of the teeth projecting into the antrum generally become carious. Crust-formations within the vestibule of the nose are commonly present.

What is the diagnosis?

A discharge of pus from one nostril, especially if periodic in character, which smells and tastes fetid to the patient, should always excite the suspicion of disease of the antrum. Upon inspection the pus will be found flowing from beneath the middle turbinated body. This pus should be carefully wiped away with absorbent cotton, and the patient be directed to lie down upon the unaffected side for ten or fifteen minutes, when, if pus reappears beneath the middle turbinated body, it may be concluded that its source is the mastoid antrum. If, while the patient is in a dark room, a 3-candle-power electric lamp is placed within

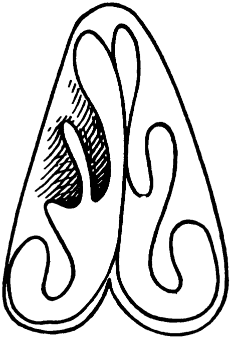

Fig. 60.—Diagram (after Freeman) showing nasal wall of the antrum so pressed outward as to resemble the appearance of the middle turbinated body in ethmoiditis during "cleavage" (see Fig. 63).

his mouth, the face will be lit up by transmitted light, and the outlines of each antrum can be mapped out if both are empty. If one is filled with fluid or any other material, that side of the face will appear darker. The observer should also observe the manner in which the light is transmitted into each nasal chamber, and more especially through the eyeballs. In some cases the antrum may contain fluid, and yet both sides of the face and each nasal chamber will be equally illuminated by the transmitted light from the electric lamp within the mouth; but if the pupil of each eye be observed, that of the unaffected side will be the brighter. In some instances, in which the outer wall of the antrum has been pressed outward by accumulations of pus, the appearance to the superficial observer is not unlike that of ethmoiditis during the period of "cleavage" (see Fig. 60).

What is the prognosis?

Spontaneous resolution generally occurs in acute catarrhal cases, the result of transient closure of the ostium maxillare from simply taking cold. Chronic suppuration of the antrum rarely if ever gets well spontaneously.

What is the treatment?

In acute catarrhal cases an effort should be made to restore the patency of the ostium maxillare in the following manner: The parts about the middle turbinated body should be thoroughly cocainized by means of pieces of absorbent cotton saturated with a 4 per cent. solution of cocain placed within the middle meatus, after which an application of a 4 per cent. solution of antipyrin and a 3 per cent. solution of menthol in olive oil should be made with an atomizer, and the parts then covered with powdered calomel. These applications should be made daily at the physician's office, the patient in the meanwhile using Formula 24 as a snuff every hour or two. Treated in this manner, resolution generally occurs in three or four days.

It should be borne in mind that all of the accessory sinuses of the nose can be inflated with air in the same manner as the ear by means of Politzer's air bag. The parts in the neighborhood of the ostium maxillare should be cocainized in order to render this orifice as patulous as possible. The patient should then lie down with the affected antrum uppermost, and puff out his cheeks and close the auditory meati with the forefinger-tips, in order to protect as far as possible the middle ears from over-inflation. The Politzer air bag is now filled with the vapor of menthol-chloroform, its nozzle inserted into the nostril, both alæ being closed about it with the thumb and fingers of the left hand in such a manner as to produce an air-tight joint. The bag is then suddenly compressed with the right hand and chloroform vapor enters all the accessory cavities of the nose as well as the middle ear. Puffing out of the cheeks causes the palate to be drawn upward by the action of the tensor and levator palati and completely closes the pharynx, so that no air can escape through the posterior nares, and hence when the Politzer bag is compressed, increased pressure is produced within the nose and all its accessory cavities, of which in this connection the middle ear may be considered one. With the patient in the position described above air bubbles through an accumulation of mucus or mucopus in the antrum and forces it out through the ostium maxillare into the nose, and the procedure may be repeated sufficiently often to completely empty this cavity, the chloroform vapor acting as an anesthetic antiseptic, and the heat of the parts causes it to expand to a greater bulk than an equal volume of air would do.

This method of treatment is especially used in the early stages of disease of any of the nasal accessory cavities. The intense frontal headache sometimes resulting from vacuum congestion of the frontal sinuses in acute nasal catarrh quickly can be relieved by applying pledgets of absorbent cotton saturated with a 4 per cent. solution of cocain to the neighborhood of the infundibuli, and, after their removal, inflating with chloroform vapor the frontal sinuses in the manner described above.

The Politzer air bag is filled with chloroform-menthol vapor by the following method: A glass-stoppered bottle is kept partly full of chloroform in which some crystals of menthol are dissolved. The portion of the bottle above the level of the fluid soon becomes filled with the vapor of chloroform-menthol, and it is only necessary to insert the nosepiece of the Politzer bag into the mouth of the bottle and allow the bag to expand to fill it with menthol-chloroform vapor. A drop or two of the solution can, if deemed necessary, be placed in the Politzer bag with an ordinary medicine-dropper; but under such circumstances the amount of vapor applied to the nasal chambers is generally sufficient to cause irritation and discomfort rather than a sedative effect.

In chronic cases efficient drainage is of primary importance. This may be accomplished by drawing the second molar tooth and penetrating the antrum through the socket of its inner fang by means of a small trocar and cannula. The trocar (Fig. 61*a*) may also be made to pierce the cavity of the antrum through the canine fossa, or preferably through the inner wall of the nose beneath the inferior turbinated body.

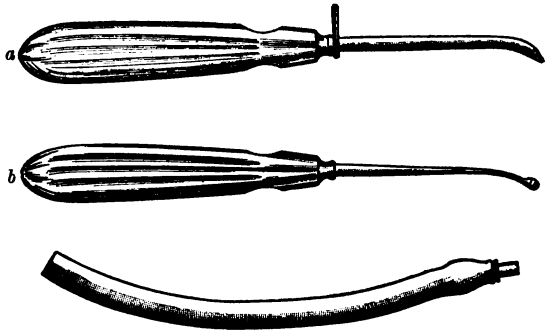

FIG. 61.—Halle's trocar and cannula for piercing the antrum through the inferior meatus: *a*, trocar and cannula; *b*, probe of obturator, by means of which the cannula can be introduced daily into the antrum through the opening made by the trocar.

In this position the opening is very slow in closing, and the cannula is very readily inserted from day to day with the aid of the obturator, (Fig. 61 *b*). Into the proximal extremity of the cannula a syringe is then attached by means of suitable fittings. No matter in which position the opening into the antrum is made, the cavity should be thoroughly cleansed once a day by means of a suitable syringe. Of the solutions recommended for use inside the antrum, a 3 per cent. solution of hydrogen, followed by a 1 to 2 per cent.

solution of nitrate of silver, probably yields the best results. The antrum should first be irrigated with warm borated water, in order to remove the major portion of the accumulated mucus. The solution of peroxid should then be thrown into the antrum and allowed to bubble out through the nose for a minute or two. The antrum is then again irrigated with warm borated water. A quantity of a 1 per cent. or even a 2 per cent. nitrate of silver solution sufficient to completely fill the antrum is then thrown in and allowed to remain for half a minute or longer, and is then washed out with the boric-acid solution, and the antrum dried by means of a current of warm air. This thorough treatment should be done by the surgeon every second or third day, the patient in the meanwhile washing out his antrum each day with hot borated water. In suitable cases a speedy cure is obtained by using two or three quarts of this solution as hot as can be borne (110°–120° F.). A hard-rubber tube of sufficient size to fit accurately the opening through the alveolus is attached to a fountain-syringe. The patient then bends forward over a bowl, and the fluid, after flowing through the antrum, escapes from the nose into the bowl.

When the opening into the antrum is made beneath the inferior turbinated body, the nasal chamber behind the opening should, whilst syringing the cavity, be so packed with absorbent cotton saturated with fluid petrolatum as to prevent the fluids used in syringing the antrum from coming into contact with the nasal mucous membrane. In the treatment of disease of the maxillary antrum it seems needless to remark that any co-existing disease of the nasal chambers should receive the careful attention of the surgeon. In a certain percentage of cases these milder measures are insufficient to bring about a cure. Under such circumstances the anterior and lateral wall of the antrum should be removed through the mouth, and the entire mucous membrane of the antrum, if pulpy and granular, should be curetted away. If the ethmoidal cells are suppurating, the nasal wall of the antrum, with the exception of its nasal mucous membrane, is then cut away with Rongeur forceps until the ethmoid cells are reached. These are also removed with the

Rongeur and curette as far back as the sphenoidal sinus, which also, if necessary, may be opened by the removal of its anterior wall. The nasal mucous membrane of the nasal wall of the antrum is then pressed into the antrum and the cavity packed with iodoform gauze. The operation is performed in the following manner:

After the patient has been etherized, the jaws are separated by a mouth-gag inserted on the side opposite to that to be operated on. To prevent blood reaching the pharynx from the mouth, a strip of gauze may be packed between the jaws and the cheek as far back as possible beyond the wound, and removed from time to time when it becomes saturated with clots. The tongue is controlled by means of suitable forceps or a suture inserted through its tip, so that it may be drawn forward when necessary to sponge blood from the pharynx should any reach that locality from the posterior nares. The patient should lie on the side to be operated on with the head in such a position as to facilitate the gravitation of blood from the nose and mouth, but if blood reaches the pharynx it can be removed by gauze sponges held in long hæmostats.

The cheek is retracted by means of a blunt retractor and an incision made at the junction of the cheek with the jaw from the posterior border of the alveolus to the anterior border of the canine fossa. The anterior and lateral bony surface of the antrum is then uncovered by means of a periostium elevator and the bone removed by means of a chisel and rongeur forceps, as far forward as the nasal wall, and as far backward as the anterior border of the maceter muscle, and vertically from the floor of the antrum to near the infraorbital canal. If the lining membrane is not wounded the operation up to this point will probably be nearly bloodless.

The mucous membrane is now incised and the cavity of the antrum examined by means of the finger, and after hemorrhage has ceased inspected. The mucous membrane will probably be found immensely thickened, granular, and covered with pus. One or more mucous polypi may be present and exposed bone detected with the finger tip. The diseased mucous membrane is now thoroughly removed with a sharp curette, and, if possible with the same instrument, a large portion of the bony nasal wall of the antrum, the little finger being inserted into the nose to facilitate the procedure.

In cases where the ethmoid cells and sphenoid antrum are normal, the operation should be concluded without the further destruction of tissue. However, where the ethmoid cells are known to be diseased, they may be thoroughly opened or curretted away as far back as the sphenoid antrum, the anterior wall of which may also be removed with the curret if necessary.

The remains of the nasal mucous membrane of the nasal wall of the antrum are now turned into the antrum to replace as far as possible its own mucous membrane previously removed by the currette, and the cavity is loosely packed with iodoform gauze. The oral wound should not be stitched. In the course of time it contracts to a small opening or becomes permanently closed.

The gauze packing is removed in whole or in parts on the second or third day, and may or may not be replaced as seems better in the judgment of the surgeon. After the gauze has been permanently removed the antrum should be cleansed daily with sterile water or Dobells' solution until the healing process is complete. This occurs in the course of five or six weeks. The antrum being greatly reduced in size during the process.

What is the most common disease of the frontal sinus?

Catarrh of the frontal sinus is more common than similar disease of any of the other accessory sinuses. The disease, however, more rarely goes on to suppuration, because the infundibulum often affords ample drainage from the most dependent portion of the cavity. Suppuration in the frontal sinus probably only occurs as the result of long closure of the infundibulum, traumatism, gonorrheal infection, maggots in the nose, syphilis, and the development of tumors within the sinus itself.

What are the symptoms of catarrh of the frontal sinus?

Frontal headache, which sometimes develops into severe pain, with nausea and vomiting.

What is the treatment?

The headache and pain can sometimes be relieved in the following manner: The parts about the infundibulum are first thoroughly cocainized, either by means of absorbent cotton saturated in a 4 per cent. solution of this drug, or by means of the spray from an atomizer containing a 2 per cent. solution of cocain. The nozzle of a Politzer bag filled with the vapor of chloroform or menthol is then so placed within the nose that its orifice points toward the infundibulum. If now the rubber bag is suddenly compressed, some of the vapor may penetrate the frontal sinus, and be followed by instant relief from frontal headache and pain. Should this maneuver succeed, Politzer's bag should be used in the manner described at sufficiently frequent intervals to prevent a return of the frontal headache. Of course the chloroform vapor enters the middle ears during the compression of the Politzer bag. Disagreeable effects can be prevented to a considerable extent by directing the patient to stop both ears with his finger-tips during the inflation. The application of cocain should be followed by spraying the upper portion of the nose with a 4 per cent. solution of antipyrin and a 3 per cent. solution of menthol in fluid albolin (Formulas 7 and 8). The patient should also use Formula 24 in the manner prescribed for acute rhinitis, and every effort should be made to maintain the infundibulum in a patulous condition until the inflammation of the frontal sinus subsides. To prevent recurrent attacks of catarrhal inflammation of the sinus, it may be desirable to remove the anterior portion of the middle turbinated body.

What are the symptoms of purulent disease of the frontal sinus?

The headache is usually persistent, but may assume an intermittent type. Upon inspection the parts about the infundibulum will be found red and swollen and covered by a small amount of pus, sometimes offensive in character. If the discharge is greatly obstructed, the roof of the orbit may be so far crowded downward as to produce displacement of the eyeball with diplopia or even amaurosis, while the anterior wall of the cavity may bulge forward in such a manner as to produce marked facial deformity. Should the posterior wall be displaced, dulness, apathy, increased headache, and other symptoms referable to the brain will probably manifest themselves, or meningitis or brain-abscess may occur.

What is the treatment?

Should it be impossible to establish free drainage, either in the manner already described for the treatment of catarrhal disease of the frontal sinus or by the removal of a portion of the anterior part of the middle turbinated body, it will be necessary to establish an opening into the antrum at a point below the eyebrow, near the root of the nose. After section of the skin and elevation of the periosteum the bone should be removed by means of a chisel and Rongeur forceps until a sufficiently large opening is made to permit of a thorough exploration of the cavity of the frontal sinus and the detection of a tumor or necrosis as the cause of the suppuration. After the external opening has been made, the cavity of the frontal sinus should be treated in the same manner advised for suppuration of the maxillary antrum. Free drainage from the frontal sinus into the nose should be established before allowing the external opening to close.

What are the most common diseases affecting the ethmoidal sinuses?

Catarrhal inflammation and purulent disease. Purulent disease of the ethmoid cells is usually associated with caries or necrosis of the bony structures, and is sometimes followed by exophthalmos, orbital abscess, and even meningitis and death. The name necrosing ethmoiditis was employed by Woakes of London to designate an inflammation usually resulting in caries or necrosis of the inferior turbinated process and other parts of the ethmoid bone; characterized, after caries has occurred, by the presence of a tenacious, creamy white, mucopurulent discharge from sinuses or a cleft in the middle turbinated body, and usually by the presence of exuberant granulations and polypi, the result of the irritation of necrosed spicules of bone upon the surrounding soft tissues.

The name has not been generally adopted by the medical profession, as there is much doubt as to necrosed spicules of bone playing a very active part in the etiology of purulent inflammation of the ethmoid cells.

What is the etiology of purulent disease of the ethmoid cells?

It is usually the result of catarrhal inflammation of the mucous membrane covering the middle turbinated body; the inflammation finally involving the periosteum and the bone beneath, and extending into the cavities of the ethmoid cells. The orifices of these cells finally become occluded as the result of swelling of the mucous membrane, granulation tissue, polypi, etc., so that the secretions cannot escape, and pressure necrosis results, with the formation of an abscess which may appear in the orbit, pushing the eye outward and forward. In some cases of orbital abscesses pressure upon the eyeball results in the flow of pus into the nose. However, in most instances the orbit is not involved, the secretions of the diseased ethmoid cells finding their way into the nose through the natural openings of the cells or by channels resulting from caries of the nasal bony wall. The secretions may be thick creamy pus or thin, scanty, and foul-smelling, drying into scales that tightly adhere to the nasal mucous membrane beneath and upon the middle turbinated body.

What is the pathology of ethmoid disease?

The mucous membrane of this portion of the nose extends inward to line the cells and trabeculæ of the middle turbinated body, and is inseparable as a membrane from the periosteum beneath. Inflammation of this mucoperiosteum results in necrosis. Necrosed spicula of bone irritate the inflamed mucous membrane and cellular tissue, which, proliferating after its kind, forms large masses of granulation-tissue and mucous polypi. These polypi partake more or less of a fibrous character in proportion to the amount of connective tissue involved in the proliferating process. The process of exfoliation is not always characterized by the presence of exuberant granulations or mucous polypi, but there is always a discharge of tenacious mucopus, which adheres to the orifice of the sinus or cleft, from which it exudes. After the exfoliation of the necrosed bone, the disease frequently undergoes a spontaneous cure, a large crater or cleft in the middle turbinated body indicating the spot from which the dead bone has exfoliated (Fig. 66).

What are its symptoms?

An early stage of the disease is well represented in Fig. 62. A red and swollen middle turbinated body may press upon the septum, which ordinarily gives way before it, so that there is a deviation toward the healthy nostril. Should both turbinated bones be diseased, the septum, with its nerves, is nipped between the hypertrophied bodies, and reflex skin rashes upon the face, such as erythema or acne, or eye disease, or any of the reflex nasal symptoms previously mentioned, may be present. Fig. 63 represents a more advanced stage of the disease. In Figs. 64 and 65 "cleavage," with exfoliation of necrosed bone, is taking place, while from the cleft, polypi or proliferating granulation-tissue protrudes. Fig. 63 shows "cleavage" without proliferation of the soft tissues, the

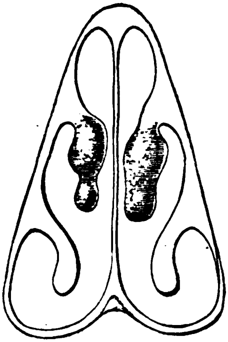

FIG. 62.—Diagram showing an early stage of necrosing ethmoiditis (Woakes).

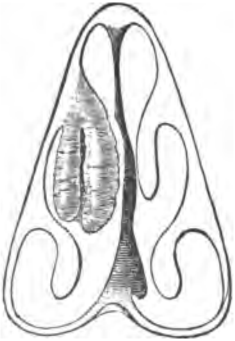

FIG. 63.—More advanced stage of the same disease, showing "cleavage" of the middle turbinated bodies (Woakes).

commonest form of the affection. From the cleft or from a sinus in the bone exudes a creamy, tenacious mucus, which the patient removes from his nose with great difficulty, while the use of a fine probe within the cleft or a sinus will lead to the detection of necrosed and exposed bone. At this stage of the disease nasal asthma and cough or paresis of the soft palate are reflex symptoms often present. In rare cases the

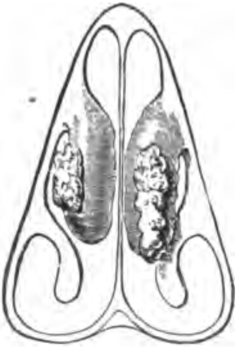

FIG. 64.—Granulation-tissue protruding from the clefts in the middle turbinated bones (Woakes).

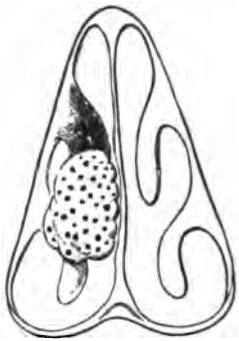

FIG. 65.—Polypus protruding from cleft in the middle turbinated bones (Woakes).

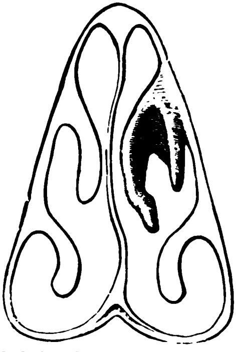

FIG. 66.—Crater-like cleft in the turbinated bone, resulting from necrosing ethmoiditis (Woakes).

introduction of a probe within the cleft is immediately followed by an epileptiform convulsion. Nasal chorea may also be present, most probably affecting only the orbicularis palpebræ and adjacent muscles of the face, but any of the reflex neuroses previously mentioned may be present at this stage of the disease. Fig. 66 shows the crater-like cleft presented when the disease has undergone a spontaneous cure.

What is the treatment?

In many cases simple cleansing of the nasal mucous membrane by means of disinfectant sprays and washes (Formulas 1 and 2) and the frequent application of an iodin solution (Formula 10) seem, with Politzerization, to be all the interference desirable. In other cases drainage from the ethmoid cells can be greatly improved by the removal of a portion of the middle turbinated body, either by means of the snare, Farnham's alligator-forceps, or, better, when there is sufficient space, Myles' or Grünwald's forceps. In cases where the ethmoid cells lie very superficial, this operation, which is easily accomplished, gives notable relief. Alligator cutting forceps will be found a very useful instrument to remove quickly polypus buds and small portions of the diseased bone. However, these forceps, unless in the best of condition and recently sharpened, cannot be relied upon to cut away any tissue smoothly and easily, and for heavier work Myles' alligator-forceps (Fig. 68) are much more effective. With these admirable instruments the diseased portion of the middle turbinal can generally be cut away quickly and easily and leave a clean smooth wound. However, occasionally portions of sclerosed bone are encountered too hard to be cut away with the Myles' forceps, and under such circumstances Grünwald's forceps (Fig. 69) will accom-

FIG. 67.—Nasal curet.

plish the desired result, although much more slowly. Both instruments are necessarily somewhat bulky, and occasionally there is not room between the septum and the turbinated bone to admit of their being used. Under such circumstances the trephine (Fig. 55) or a burr provided with a similar shield should be employed to remove all tissue that interferes with the proper drainage of the parts. The cutting forceps are, however, by far the preferable instruments, as they cut bone, mucous membrane, granulation-tissue, and polypi with equal facility, and leave a smooth flat wound which more readily heals than the wound resulting from the use of a burr.

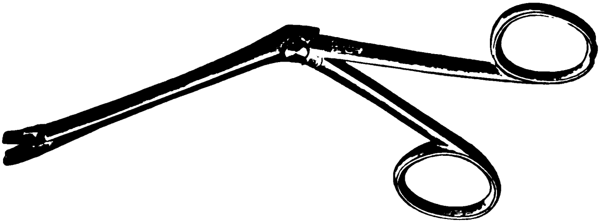

FIG. 68.—Myles' nasal cutting forceps.

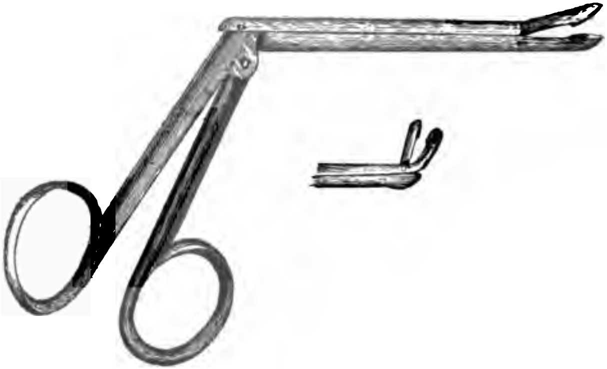

FIG. 69.—Grünwald's cutting forceps, for operation on the middle turbinal.

When the disease is deeply situated, the operator should remember the important structures by which the ethmoid bone is surrounded, and every operative procedure should be done with extreme care and gentleness, to avoid a serious or even fatal result. When an orbital abscess has formed, it should be opened, and if deemed necessary the curet used until a sufficiently wide opening is established into the nose. The parts are then packed with gauze, which is renewed from day to day, care being used at each dressing to maintain the opening into the nose until the parts have thoroughly healed, the curet being used from time to time if necessary.

What is the prognosis?

The course of the disease, even under proper treatment and operative procedures, is generally tedious, but a cure is sooner or later brought about by persistent effort, while in some instances it may be quickly and easily obtained.

Describe purulent inflammation of the sphenoidal cells.

It is probable that catarrhal disease of the sphenoidal cells is of not infrequent occurrence. Generally, it subsides spontaneously. The situation of the ostium sphenoidium is such as to favor the development of purulent disease of the sphenoid with final necrosis, and somewhat numerous cases are recorded in which this has occurred.

What are the symptoms?

Purulent discharge through the nose and pharynx; pain, at first in the upper part of the throat, and later involving the whole side of the face. Ocular symptoms occur as the result of the proximity of the optic foramina, and vary from impairment of the periphery of the field of vision to complete blindness.

What is the treatment?

The treatment should consist, until an operation is deemed advisable, in the use of disinfectant sprays and washes (Formulas 1 and 2), and the application of alterative solutions to the mucous membrane of the upper part of the nose and vault of the pharynx.

If necessary, the sphenoid antrum may be penetrated through the nose at its most dependent position by means of a trocar or drill; but, as the danger of penetrating the cranial cavity is great in this position, the sphenoid antrum may be more safely opened in the vault of the pharynx through the lower part of the body of the sphenoid bone. If the wings and body of the sphenoid bone are necrosed, the diseased parts can probably best be reached through the orbit. Whether an opening has occurred spontaneously or has been made artificially into the cavities of the sphenoid, its patency should be maintained by suitable antiseptics and astringent washes.

What is the differential diagnosis between diseases of the accessory cavities?

In disease of the antrum, the frontal sinus, and the anterior ethmoid cells the pus makes its way anteriorly and is discharged through the nose. In disease of the middle and posterior ethmoid cells and the sphenoidal sinuses most of the pus finds its way into the pharynx.

Placing the head well forward between the knees or lying upon the unaffected side favors a discharge of pus from the maxillary antrum, while the upright position favors a discharge from the other sinuses.

Exophthalmos is most frequently the result of disease of the ethmoid bone, but may occur as the result of sphenoid disease. Ptosis, strabismus, or sudden blindness is generally the result of disease of the sphenoid, but narrowing of the field of vision may also occur as the result of ethmoiditis or disease of the antrum of Highmore. Facial neuralgia is most commonly caused by disease of the maxillary antrum, which is probably the most commonly diseased of all the accessory sinuses.

TUMORS.

NASAL POLYPUS.

What tumors are found within the nose?

Myxoma or mucous polypus, fibroma or fibrous polypus, cyst, ecchondroma, exostosis, osteoma, papilloma, angioma, sarcoma, and carcinoma.

In what respects do fibrous polypi differ from the soft or mucous polypi?

Instead of being soft, gelatinous, and highly hygrometric, fibrous polypi are hard and fibrous. They usually have their attachment in the posterior portion of the nasal chambers. When attached to the junction of the nose and pharynx the fibrous tissue is so abundant that the resulting tumor is a true fibroma almost as hard as bone. Nasopharyngeal fibroma are extremely vascular, bleeding sometimes at the slightest touch. They hang down from the vault of the pharynx so as to be plainly visible through the mouth, and may send prolongations into the nose and all of the adjacent cavities, either bending around obstacles or eroding their way through them, enlarging the nasal chambers, thinning the bones, and broadening the bridge of the nose as they grow; causing great deformity, or what is sometimes called "frog face." Fibrous polypi are prone to degenerate into sarcoma, while mucous polypi do not display this tendency to so great a degree. Both mucous and fibrous polypi are probably local hypertrophies of the mucous membrane and submucous tissues that have undergone mucoid degeneration or fibrous change.

Describe nasal cyst or cystic polypus?

Nasal cyst usually occurs as a large sessile bladder, filled with a thin, watery, mucous fluid, and attached to the inferior turbinated bone.

What is the etiology of polypus?

Any long-continued irritation of the nasal mucous membrane may result in polypi. The most common causes are ethmoiditis or defective nasal drainage, as the result either of bony ridges on the septum, a deviated septum, or of hypertrophies of the lower turbinated bone, so that pent-up nasal discharges constantly keep the nasal mucous membrane in a soaked and boggy condition: the mucous membrane of the upper part of the nose being most prone to undergo polypoid degeneration from its pendent position.

What is the treatment?

Removal of the nasal polypi and the cause that produced them, in the manner described in the sections upon Necrosing Ethmoiditis and Hypertrophic Rhinitis. The mere removal of the polypi is usually only the first step toward bringing about a cure of the nasal disease. Simple removal is usually followed by a relapse into the former condition. Therefore after the removal of the growth the surgeon should not be content until the parts from which they grew have firmly cicatrized, and it is well even then to see the case once every two or three months in order to ward off a possible relapse by snaring off promptly any small polypus or bud, which may be the first tendency exhibited toward a relapse into the former condition.

As nasopharyngeal fibromata consist of fibrous tissue containing numerous large blood-vessels, which because of the hardness of the tissue in which they are imbedded cannot contract, when severed, bleed profusely. Such tumors cannot readily be severed by an ordinary snare. The best imported steel piano wire usually snaps during the attempt, or the snare may be twisted into a cork-screw shape if an attempt is made to tighten the wire by turning the screw of the instrument with a wrench. The growth is, however, readily removed by means of a galvanocautery snare with its red-hot wire. Relapses are common, although the disease generally attacks children, and there is a distinct tendency toward slower growth of the tumor as the individual advances in years.

It is generally somewhat difficult to encircle a nasopharyngeal fibroma with a platinum wire because of its lack of resiliency, and imported steel piano wire will answer for use with the galvanocautery provided sufficient care is exercised not to heat it above a dull-red heat. A loop of steel wire should be pushed through the one nostril until the loop appears in the mouth. Two fingers of the right hand are then passed through the loop and up behind the palate, posterior to the growth. By manipulating the ends of the wires hanging out of the anterior naris the loop is made to slide over the fingers and finally encircle the neck of the tumor. The procedure is by no means always easy, and the operator may be embarrassed by a somewhat profuse hemorrhage. When the loop is in place, the ends of the wire are threaded into the galvanocautery snare and slowly tightened, and then the current of electricity in sufficient amount to bring the loop to a dull-red heat is applied, traction upon the loop being made in the meanwhile so that it will burn a short distance into the growth. The current is then turned off and the loop again tightened and the procedure repeated. Thus slowly and cautiously the growth should be severed from its attachment, for if the greatest care is not exercised the operator may encounter at any stage of the operation the most profuse and alarming hemorrhage, and the necessary appliances for quickly plugging with gauze or cotton both the anterior and posterior nares should always be conveniently at hand before undertaking an operation on one of these growths.

They may be destroyed by electrolysis, but the process is somewhat painful and very tedious. The galvanocautery snare when it can be used is by far the preferable method of treatment. It can be used during ether narcosis, or even with local anesthesia.

NASAL PAPILLOMA—SARCOMA.

Describe nasal papilloma.

Nasal papillomata are wart-like growths most frequently attached to the septum or inferior turbinated bodies. Nasal papillomata are generally abundantly supplied with capillaries, and some of them bleed at the slightest touch.

What is the treatment?

They should be removed with the snare and the place of their implantation touched with the galvanocautery to prevent a recurrence.

Describe nasal sarcoma?

Sarcoma within the nose present the same pathologic characteristics as when present elsewhere. It may occur as a primary growth, or result from the degeneration of fibrous polypi or papillomata. A nasal sarcoma is generally sessile and of a light reddish color. In children they grow very rapidly, and are prone to ulcerate with the result of producing a fetid greenish or bloody discharge. Penetrating the surrounding structures, great deformity of the face often results. If growth occurs in an upward and backward direction, tinnitus, deafness, and severe pain are usually present, while death may occur from final involvement of the brain in the disease.

What is the prognosis?

In children the growth ordinarily occurs so rapidly that an early fatal issue is to be expected, while in adults a slower growth makes early and complete evulsion practicable. The tumor will, however, return with increased malignancy if imperfectly removed.

What is the treatment?

Early and complete removal of the growth, of course, presents the only chance of recovery. Palliative treatment consists in the use of detergent washes and anodyne applications. A 4 per cent. solution of the muriate of cocain may be applied on absorbent cotton to relieve pain, and Formula 21 or 23 applied with the powder-blower for the same purpose and also as a disinfectant. Complete excision of the upper jaw on the affected side is necessary when the growth has attained any size, but even after the most complete operation relapses are the rule rather than the exception.

NASAL CARCINOMA.

Describe carcinoma of the nose.

Carcinoma of the nose is of extremely rare occurrence as a primary affection, but may invade the nasal cavities from surrounding parts. It is usually of the epitheliomatous or encephaloid type.

What is the treatment?

Early and complete removal of the affected structures furnishes the only chance of a cure. Palliative treatment consists in cleanliness, nutrients, and the application of mild astringents to retard growth.

SYPHILITIC RHINITIS.

What is syphilitic rhinitis?

A diseased condition of the interior of the nose dependent upon the presence of syphilitic virus.

What other names is it known by?

Syphilitic catarrh or ozena; specific rhinitis; and, according to the stage of the disease, syphilitic coryza; nasal gumma; tertiary nasal syphilis.

What is its pathology?

It is exceedingly rare to find the primary lesion of syphilis or chancre existing inside the nose, from the fact that the syphilitic virus is rarely introduced inside the nasal chambers, and that, should such an event occur, the secretions of the parts tend to wash away the morbid matter before inoculation takes place. Secondary lesions of the nasal mucous membrane are analogous to, and often coincide with, those appearing upon the skin. They vary from a mere erythema of the nasal mucous membrane with increased secretion to intense hyperemia and swelling, with the presence of shallow ulcers, secreting a sanious and offensive mucopus. During the tertiary period, nasal gummata are by no means rare. They appear as irregular nodulated swellings distending the mucous membrane of any part of the interior of the nose. A nasal gumma may be absorbed, leaving in some instances a characteristic cicatricial contraction, or it may break down and produce an ulcer, before which the cartilages and even the bony structures of the nose may melt away like wax as the ulceration rapidly extends, thus producing in a marvelously short time the most hideous deformity. When the ethmoid has thus been necrosed and exfoliated, there may remain, after the healing process is complete, but a thin fibrous membrane between the interior of the nose and brain. In other instances the septum, nasal processes of the superior maxillary, and the nasal bones may be partly destroyed in such a manner that the nose becomes flattened upon the face, producing a most serious deformity. In aggravated cases the soft parts may also be involved in the process, until finally the anterior nares are represented merely by an irregular hole in the face. During the ulcerative process of a gumma the breath is generally very offensive, while a peculiar odor emanates from the bodies of all syphilitic persons in whom the disease is active. Hereditary syphilis pursues the same course as the tertiary form of the acquired disease.

What is the treatment?

Constitutional treatment is of primary importance. The primary and secondary lesions are probably best treated by the internal administration of a pill containing ¼ of a grain of the protiodid of mercury (Formula 27). The patient may take one of these pills three or four times a day, and a sufficient quantity of opium should be administered to prevent their producing diarrhea. Any ulceration upon the nasal mucous membrane should be touched every other day with the acid nitrate of mercury, 1 part to 4 parts of water, until they are healed; and the inflammation treated in the meanwhile as a case of simple chronic rhinitis. However, although the applications of acid nitrate of mercury are effectual in bringing about a rapid healing of the ulceration, they are somewhat painful; and if the patient complains bitterly of the pain, a solution of nitrate of silver, 60 grains to the ounce, should be substituted or the ulcerations merely may be dusted with powdered calomel. Calomel should not be used locally, of course, when the patient is taking potassium iodid.

In tertiary syphilitic rhinitis the "mixed treatment" answers a very useful purpose, for, while the iodid of potassium is not a specific in syphilis in the sense that mercury is, yet it gives a much quicker result in controlling tertiary manifestations. One, two, or three teaspoonfuls of Formula 26 may be given three or four times a day, according to the emergencies of the case and the patient's susceptibility to mercury. Mercury may also at the same time be administered by inunction or fumigation, or, in cases where the most speedy effect possible upon the syphilitic lesion is desired, it may be administered hypodermically. From 8 to 20 minims of Formula 38 should be injected into the cellular tissue of the back every day or at less frequent intervals. If thrown into the cellular tissue of the back, a solution of corrosive sublimate, not stronger than that of Formula 38, will not produce an abscess; but causes some pain, which, however, quickly subsides; while the *insoluble* compound of mercury at first produced in the tissues is *slowly* absorbed and exerts a constant action upon the disease unattainable by any other method of using the drug, because of its rapid elimination from the system. But a few hypodermic injections are ordinarily required to limit the spreading of a gummatous ulcer, which speedily assumes a more healthy appearance. In cases where gummata are so situated as to cause obstruction to nasal respiration, pain, and intense headaches from pressure, the action of medicines upon the growth are too slow, and operative procedures must be resorted to. A gumma may be removed from a turbinated bone with the snare, or scraped from the septum with a large nasal curet. Such operations, however, should not be performed upon patients of debilitated constitutions, or those who are not, or cannot quickly be brought under the influence of mercury, as otherwise the wound made by the operation will not heal, and may result in extensive ulceration. When a nasal gumma has broken down and is ulcerating, the parts should be kept scrupulously clean by the use of an antiseptic solution (Formula 2 or 3), and the wound stimulated to heal by the daily application of acid nitrate of mercury diluted with four parts of water. Wounds resulting from operations upon gummata should be treated in the same way until the healing process is complete.

DISEASES OF THE SEPTUM.

Describe the anatomy of the septum.

The nasal septum consists of bone and cartilage covered by mucous membrane. Its cartilaginous portion is the so-called triangular cartilage, because it fits into a triangular space between the perpendicular plate of the ethmoid and the vomer (Fig. 70). It articulates with the perpendicular plate of the ethmoid, the vomer, nasal crest of the superior maxillary and palate bones, the nasal spine of the superior maxillary, the lateral shield cartilages, the crest of the nasal bones, and the nasal spine of the frontal bone. Besides the perpendicular plate of the ethmoid and the vomer, the nasal crests of the superior maxillary, palate, and nasal bones, as well as the nasal spines of the superior maxillaries, enter into the formation of the septum, the rest of the septum fitting into a groove between these two sets of processes. The nasal septum is covered by mucous membrane, beneath which, near the nasal floor, is ill-developed erectile tissue, and above the specialized nerve-filaments of the sense of smell.

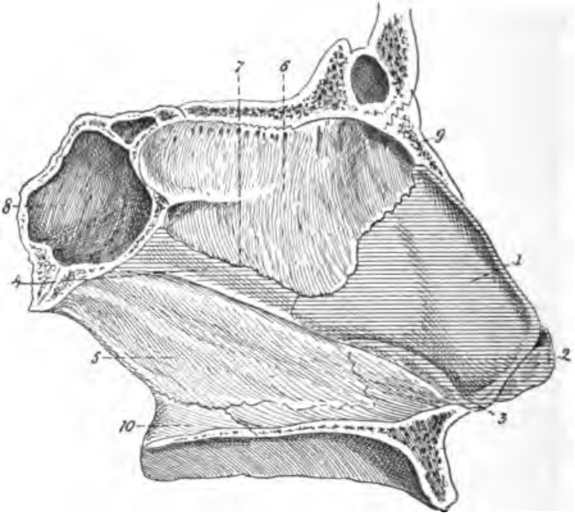

FIG. 70.—Osseous and cartilaginous septum of the nose: 1, triangular cartilage of the septum; 2, columnar cartilage, cartilage of the aperture; 3, cartilage of Jacobson; 4, supravomerine cartilage sometimes present; 5, vomer; 6, perpendicular plate of ethmoid; 7, ethmovomerine suture; 8, sphenoidal sinus; 9, nasal bone; 10, palate bone (Arnold).

DEVIATION OF THE SEPTUM.

What is understood by deviation of the septum?

Normally, the septum is vertical, but after the seventh year, deviations generally toward the left are somewhat frequent. Such deviations from the vertical only may be considered pathologic when they interfere decidedly with nasal respiration or, by pressure upon the middle or inferior turbinated body, cause pain or nasal reflexes.

What is its etiology?

Traumatism is by far the most common cause of the *pathologic deviations*, the most frequent traumatism being a dislocation of the triangular cartilage and the anterior portion of the vomer from each other and their attachment to the nasal crests of the superior maxillaries. Under such circumstances the deviation is of the so-called angular variety, because the dislocated horizontal edge of the septum projects into the obstructed nares as a sharp edge or ridge running back as far as the dislocation extends. The dislocation rarely or never involves the whole septum, because the posterior portion of the septum is defended from the effects of traumatism by its bony lateral walls. Rarely is more than the anterior third of the septum involved in a deviation, and it is therefore more exact to speak of a deflected area of a septum rather than a deviated septum.

Between the edges of the dislocated bones and cartilage "provisional callus" is thrown out, which finally unites the separated edges with a firm bony or cartilaginous union, usually thicker than the normal septum, and hence the so-called "hypertrophied angle" of a septal deviation. It will be seen that after the organization of the "provisional callus" that the septum has notably increased in size, it is redundant and too large to occupy a vertical position within the nose.

It will be observed that a partial dislocation of the vomer from the nasal crests of the superior maxillaries necessitates a vertical bending of the triangular cartilage toward the obstructed naris, and either a drawing downward of the tip of the nose, a fracture of the cartilage, or a separation of the cartilage from its articulation with the vomer, and in extreme cases also partly from its articulation with the perpendicular plate of the ethmoid. It is probable that in the majority of cases the latter takes place, as in most traumatic or angular deviations there is usually considerable thickening at the posterior articulation of the triangular cartilage with the bones of the septum, the result of the deposit of provisional callus. It follows that in all deviations of the septum there is redundancy of the deviated area, both in the vertical and horizontal direction. According to the extent posteriorly of the dislocation of the septum from the superior maxillary may the deviation be described as vertical or horizontal. In comparatively rare cases a vertical deviation of the septum will involve so little of the septum anteroposteriorly as scarcely to admit the blunt end of a lead-pencil into the deflected area at the base of the septum. Such a deflection probably would result from a very rapid and violent bending of the tip of the nose to one side.

Probably the larger number of deviations, so slight as not to be considered pathologic, are the result of a faulty development of the bones of the face or unilateral paralysis of the dilator muscles of the anterior naris. During inspiration the anterior nares are dilated by muscular action. Should this not take place on one side a partial vacuum would be formed during inspiration in the corresponding nasal chambers, and it is stated that this partial vacuum is sufficient in some cases to deflect the septum from the median position. It is stated that adenoids and other causes of defective nasal respiration cause a high arching of the palate, and the septum crushed between this abnormally high arch of the palate and the nasal bones is bowed, as it were, out of the median position. During the development of the bony parts of the septum the floor of the nostril is not rigid; for the sutures between the maxilla, palate, and intermaxilla are wide and are filled in with soft tissue, on which the septum rests. Should ossification of this soft tissue occur too soon, it is stated that it would materially interfere with the growth of the septum, causing it to be deflected or crumpled.

As a matter of fact, a comparatively large proportion of deflected septa are encountered, associated with a high arch of the palate, in which the deviation is pathologic and evidently not traumatic. Such deviations are curvilinear instead of angular, sometimes S-shaped, and there is usually little or no thickening of the sutural lines. However, they rarely if ever involve the whole septum. An unsymmetrical development of the two sides of the face existing, if it involves the septum to a sufficient degree will produce deviation of the nasal septum toward the side of the face which is the smaller.

What is the pathology of deviation of the nasal septum?

The pathology has been already discussed somewhat at length under the etiology of the condition. Septal deviations occur in almost endless variety. A simple classification is physiologic and pathologic, angular, with or without hypertrophied or thickened tissue at the angle, round and S-shaped, vertical and horizontal. The deviation usually involves little more than the anterior third of the septum, and almost never if ever the entire septum. In almost all cases of sharp, angular deviations hypertrophic changes occur at the apex of the angle, the narrowed nostril being still more obstructed by the bony ridge.

What are the symptoms?

There is sometimes some deformity of the external nose, the tip of the nose being turned to one side or the bridge flattened. The degree of obstruction in the narrowed nostril is in proportion to the deviation of the septum and may amount to occlusion. Usually in such cases there is complete obstruction to inspiration from a valve-like action of the ala of the affected side, while expiration is somewhat free and unimpeded as the result of the blowing outward of the ala by the expired air. Nasopharyngeal catarrh is usually present and is the direct result of the deviation. It will be observed that during inspiration a partial vacuum occurs posterior to the obstruction, and consequent vacuum congestion; that is, the decreased atmospheric pressure behind the obstruction engorges the blood-vessels of the mucous membrane by a species of suction. The vacuum congestion and consequent catarrhal inflammation frequently extend backward to the nasopharynx. Vacuum congestion also occurs within the dilated portion of the unobstructed nostril, and when chronic catarrh of the middle ear results, it is often that upon the side of the unobstructed nostril that first is affected. It might be objected to this mechanical theory of the causation of vacuum congestion back of a deflected area upon the septum that any partial vacuum resulting during inspiration would be counteracted by increased pressure during expiration. That this is not the case is due to the fact that expiration is more deliberate and passive than inspiration and the valve-like action of the ala referred to above.

The amount of obstruction to nasal respiration resulting from a deflected septum is precisely the same as if the obstruction resulted from an exostosis. When the obstruction is complete for inspiration the individual loses one-half his nasal breathing space; for what breathing space is lost in one nostril is not compensated for by increased breathing space in the other, because the unobstructed nostril is not larger, either anterior or posterior to the obstruction, and hence will not transmit more air than if the septum were not deflected.

In the dilated area of the unobstructed nostril the inferior and sometimes the middle turbinated bodies are frequently hypertrophied, probably as the result of the increased blood-supply resulting from the decreased atmospheric pressure in the dilated area referred to above. As the result of such hypertrophy the breathing space within the dilated area may be reduced to normal limits. In the obstructed nostril the turbinated body may become atrophied from the pressure of the deflected septum. Should the deflection be so located as to cause pressure upon the middle turbinated body, pain and nasal reflexes are usually present. Fortunately deflection of the septum in this region is comparatively rare, and if present without obstruction to respiration the removal of a portion of the middle turbinal will prove an easier and more satisfactory operation than an attempt to restore the septum to a vertical position. Pressure symptoms may also be relieved in some cases by the removal of a portion of the septum by saw or chisel.

In some cases when the deflection is so slight as scarcely to be considered pathologic erosions occur upon the septum. The inspissated secretions of such erosions being in a hollow of the septum, and hence not in the direct breath-current, are usually removed by the finger-tip or by violently blowing the nose. Usually some of the septal tissue is removed with the accumulation and hemorrhage results. The condition is a common cause of recurrent nasal hemorrhage. When such accumulations are removed by the finger-nail the erosion usually becomes deeper and deeper, until the individual literally picks a hole through his septum. The condition is often best corrected by excising a sufficient portion of the septum in front of and, if necessary, behind the erosion to secure a flat surface. The erosion usually then promptly heals and "scabs" cease to recur. Depressions upon the septal surface apparently only produce the symptoms described above when they exist at the anterior portion of the septum, because the more abundant secretion of the deeper portions of the nose prevent drying of accumulations in any hollow area of the septum.

What two factors interfere with the success of operations for the correction of deviation of the nasal septum?

Redundancy and resiliency. The septum is too large to occupy a vertical position within the nose, and hence any operation to be successful must provide for the redundancy of the septum, both in the horizontal and vertical direction. The simplest method would seem to be a rectangular crucial incision through the center of the deviation. After such an incision, if the deviated area of the septum is brought into the median position, the edges of the four triangular flaps overlap, and thus the redundancy of the septum in both the horizontal and vertical directions is provided for. Redundancy of the septum is equally well provided for by multiple incisions through the septum, crossing each other at a common center, and by L, ⊥, U, and I incisions through the septum. This is far from being true as regards the resiliency of the septum. Septal resiliency is best counteracted by means of a long, narrow, quadrilateral flap.

It must not be supposed that because the deviated area of a septum is too large to be crowded into a position on a plane every point of which is equidistant from the lateral walls of the nose, that, therefore, the tissues of the deviated septum are subjected to tension which, if released, would result in the deviated area of the septum assuming a normal vertical position as the result of its resiliency. On the contrary, if a deviated septum be dissected out from the nose, its deviated area does not change its shape, and if pressed into a position parallel to the rest of the septum, it immediately springs back into its original deflected position as soon as the pressure is released. However, this is true to a somewhat less degree if the redundancy of the deviated area is provided for in both the horizontal and vertical directions by any of the incisions mentioned above, because under such circumstances the flaps overlap and the inherent resiliency of the septum is not increased by compression. It must not be imagined, as stated by some authors, that the resiliency of the septum is *destroyed* by incisions of any shape, mentioned above, as the resulting flaps when bent all tend to spring back into their former position.

Resiliency of the septum is an inherent quality of both the bony and cartilaginous septum. However, if the bony portion be fractured, the broken bone remains in the position in which it is placed, and the resiliency at the line of fracture is destroyed. The cartilage of the septum, on the other hand, is not readily fractured, but when bent at a right angle or more, its resiliency is greatly lessened for a considerable time.

What operations have been devised for correction of deviation of the nasal septum?

The simplest operation is that introduced by Bosworth—the removal of the hypertrophied angle of the deviation with a saw. The operation is successful to the extent that it secures increased breathing space in the obstructed nostril, and the septum probably is brought more nearly into the median line as the result of the contraction of the resulting scar.

Fletcher Ingals of Chicago makes an oblique incision through the membrane of the convex portion of the prominence. He then detaches the membrane a certain distance on each side of the cut from the underlying cartilage, exposing the latter. A triangular piece is then cut out, the base of the triangle being at the floor of the nose. Care should be taken to detach the cut piece from the lining membrane of the other cavity *without tearing or cutting through it.* The first incision is closed by stitches, and the cartilage is pressed into line and supported by means of tampons.

An operation formerly frequently performed in Philadelphia is described by Sajous as follows: "The least difficult operation, and one which has always given me great satisfaction, in simple cartilaginous deflections, is an incision through the protuberance, following its long axis. A smart hemorrhage occurs as soon as the incision is made, but it soon ceases. The end of the finger being introduced into the nostril, the septum is forcibly pushed beyond the center and maintained there by packing the previously obstructed nostril with carbolized oakum. The cut edges of the cartilage override each other, and after a couple of weeks are firmly united." In this operation the lower portion of the septum is practically immovable by the finger, and hence the upper portion of the septum when brought into the median line hooks over the lower because of its redundancy, and to a certain extent is prevented from returning to its former deflected position. However, Sajous does not depend upon this support, but uses a pad of oakum. Seiler describes practically the same operation, but uses as a means of support a steel pin, which, while the finger is still in the nose, is thrust through the skin at the lower extremity of the nasal bones and then downward between the finger and the septum until its point is imbedded in the portion of the septum below the horizontal incision. After the finger is withdrawn from the nose, a few blows from a lead mallet serve to drive the pin firmly into the superior maxillary bones at their suture. At the end of about ten days the steel pin becomes loose and useless as a means of support and has to be withdrawn.

Watson describes his operation as follows: "I make an incision, which may be called a bevelled incision. The edge of the knife is directed upward and toward the opposite side, and carried through the cartilage, but not the mucous membrane of the opposite side. The incision is made just at the crest of the deviation. Any vertical deviation is cut out, as before described (Ingals' operation). The upper portion is then pressed over toward the other side, where it hooks itself on the lower, and is thus held in place."

Watson's operation is apparently a somewhat ingenious combination of the methods of Ingals and Sajous, and no detail of Watson's operation is original except, perhaps, that he more carefully bevelled his horizontal incision through the apex of the deviation. When the apex of the deviation is not hypertrophied, it would seem that in so thin a structure as the septum it is impossible to obtain any appreciable *bevel*, and as bevelling does not increase the resistance to the septum assuming its former abnormal position, it is difficult to understand its importance. The preservation of the mucous membrane on the concave surface prevents the flap being bent at a sufficiently acute angle to destroy its resiliency. In the older operations of Sajous and Seiler this same hooking of the upper fragment over the lower was found not sufficient to retain the parts in position, probably because of pressure necrosis; and support for a tediously long period by pins or plugs was found insufficient to secure invariably good results.

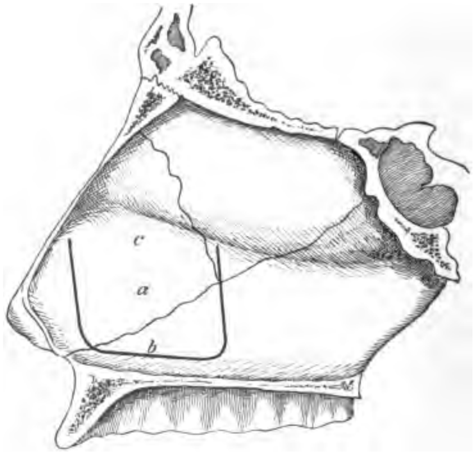

FIG. 71.—Diagram of author's operation. The traumatism originally causing the deflection is practically reproduced by converting the deflected area of the septum into a quadrilateral flap: *a*, deviated area of the septum, surrounded by a U-shaped incision; *c*, neck or base of the resulting quadrilateral flap; *b*, its inferior edge.

The writer's method of operating for deflection of nasal septum is as follows: A U-shaped incision (Fig. 71) is made around the deviated area (*a*), which then becomes a quadrilateral flap, covering a hole in the septum; a sort of trap-door with a spring hinge holding it in a deviated position. This quadrilateral flap is then, with the finger-tip, pushed through the hole in the septum, which it covers, and its neck (*c*) is bent at the same time at a right angle. If the deviation area is of the horizontal type and extends far back along the septum, the neck of the quadrilateral flap will contain a considerable amount of bone. When the neck of the flap is bent at a right angle this bone will be fractured with a snap, often audible at a considerable distance. The resiliency of the bony portion of the flap is then *completely* destroyed, because fractured bone remains in the position in which it is placed. As a matter of fact it, to a certain extent, acts as a splint to retain the cartilaginous portion in a vertical plane, which it is usually impossible to fracture even by bending to a right angle.

However, by the thorough bending of the cartilage, the resiliency of the flap is diminished, for the time being, to the extent that it hangs without support in the vertical position, its redundant edge overlapping, without pressure, the edge of the hole in the septum, in front, below, and behind.

The quadrilateral shape of the flap has much to do with its remaining in a vertical plane. In any cartilaginous septal flap the resiliency tending to reproduce the original deformity is proportionate to the width of the base (*c*) of the flap. In the triangular flaps used by Asch, Roberts, Watson, and others the width of the base of the flap rapidly increases with the size of the flap. In the quadrilateral flap the base of the flap (Fig. 71, *c*) is always of the same width as its edge (*b*), and consequently, because of constantly increasing leverage proportionate to the length of the flap, in long, narrow, cartilaginous flaps, but very little support at its lower edge (*b*) is required to maintain such a flap in the vertical plane. This very important factor in the success of operations for the correction of septal deflections may be demonstrated by cutting flaps of various shapes in the side of a rubber ball, the resiliency of which may be compared to that of the cartilaginous septum. It will be observed that long, narrow, quadrilateral flaps cut in the rubber, when bent into a vertical plane, manifest but little tendency to spring back into their former position. Right-angled triangular flaps, on the contrary, when bent into a vertical plane are maintained in the new position only by exerting considerable pressure. Hence long, narrow, quadrilateral, cartilaginous, septal flaps, when bent into a vertical plane, remain almost without support in their new position. Hence, Myles has modified the writer's operation in narrow vertical deviations by making a vertical, long, narrow, quadrilateral flap of the deflection without cutting through the mucous membrane of the concave surface. It is not necessary, in most instances, to diminish the resiliency of such a flap by thorough bending of its base, and healing is said to result more quickly as the result of preservation of the integrity of one mucous surface of the septum. However, extremely narrow vertical deviations of the anterior part of the septum generally heal rapidly and give very little trouble, and it is safer to more thoroughly bend any septal flap than is possible if the integrity of one mucous surface is preserved. The main idea in devising this operation was to provide a better method of overcoming the resiliency of the septum than those in vogue, and all other considerations are sacrificed to this idea. In the more modern operations it is not septal *redundancy*, but the neglect or the impossibility of providing for septal *resiliency* that causes failure. The resiliency of the septum is exerted for months upon septal flaps after apparent healing, and often gradually reproduces, in part at least, the original deviation. It is impossible to judge of the success of an operation for septal deviation until at least six months have elapsed. Therefore it is best in most instances to slightly overcorrect the deviation.

The technic of the writer's operation is as follows: Both sides of the septum are anesthetized by packing the nose with pledgets of absorbent cotton saturated with a 3 to 4 per cent. solution of cocain. This is allowed to remain in contact with the parts for one-half to an hour, in order that this weak solution of cocain may penetrate deeply into the tissues. The nostrils are sprayed with a 1 : 1000 solution of adrenalin. The line of incision is then painted by means of a cotton-tipped probe with a 10 per cent. solution of cocain in order to produce profound superficial anesthesia.

The field of operation is brought into view by means of the self-sustaining speculum (Fig. 22), and a straight Sajous saw is introduced into the obstructed nostril, close to and *parallel* to the floor of the nose. The septum is sawed transversely until the saw has obtained a firm hold upon the tissues; the direction of the sawing is then somewhat rapidly changed, until it becomes nearly vertical, the saw meanwhile being carefully maintained in a position *exactly parallel* to the septum. A gush of blood from the unobstructed nostril indicates that the sawing has extended through the septum. The saw is now partly withdrawn and its tip pushed through the cut into the unobstructed nostril. The anterior crus of the U-shaped incision is made by sawing upward with the tip of the saw. The posterior of crus is most quickly made by introducing a probe-pointed, double-edged knife, curved on the flat (Fig. 84), from the obstructed nostril through the saw-cut. The index-finger tip is then introduced into the unobstructed nostril. Finger and knife together reach the posterior limit of the deviated area, and the posterior crus of the U-shaped incision is quickly and easily made.

If the deviation is toward the right nostril the operator wets his left forefinger in sterile water, while if the deviation is toward the patient's left nostril the right forefinger, after being wetted, is introduced into the obstructed nostril, pushing and, if necessary, lifting up the deflected area until it has been thrust through the hole in the septum which it covers. The operator's forefinger-tip is then carried up along the anterior and posterior crura of the U-incision to make sure that the flap has completely cleared them, the finger-tip is then thrust through the hole in the septum beneath the quadrilateral flap until the lateral wall of the nose in the unobstructed nares is touched. The finger is then pressed upward until the flap is bent at a right angle, and any bone in the neck (Fig. 71, *c*) of the flap breaks with an audible snap. This is of the utmost importance, and in horizontal deflections the success of the operation depends *entirely* upon the bending of the flap being thoroughly done. In vertical deflections too narrow to permit of the forefinger being used, the little finger should be employed.

After the thorough bending of the flap it should hang in the formerly unobstructed naris without resiliency; and either Allen's tube or the writer's modification of the same should be dropped into the formerly obstructed nostril. Should any impediment to its free entrance into the nostril be encountered, it is probable that the U-shaped incision has been improperly made and has passed *through* instead of *around* some portion of the deviated area. This is usually the posterior portion of the deflected area, the posterior crus of the U-shaped incision being made too far forward. An effort should be made to bring this deflected posterior edge of the incision into line with the finger-tip in order to admit of the easy introduction of the tube, and, failing in this, the end of the tube should be compressed by the fingers in such a manner as to permit of its easily being passed beyond the obstruction. The tube should always fit *loosely*. Any great amount of pressure exerted by the tube becomes well-nigh intolerable within twenty-four hours. The tube serves to control the usually trifling hemorrhage. It is worn over night, and the next day it is decided if its support is longer necessary. In rather more than 80 per cent. of cases of deviation of the nasal septum operated upon by the method described above, no support whatever was necessary.

The after-treatment consists in the patient presenting himself at the surgeon's office daily, in the meantime attending to his usual avocation if not too laborious. At each daily visit the parts are inspected and, if necessary, cleansed. At first the overlapping of the edges of the flaps resulting from its redundancy will appear excessive because of the swelling of the parts; within a week or two this swelling will have disappeared and also, apparently, much of the redundancy, because in traumatic cases the redundancy is newly formed tissue, "provisional callus," and hence is readily absorbed. At any time any redundant thickening can readily be removed by means of a knife, saw, or Myles' forceps (Fig. 68), but unless the obstruction is so large in the formerly unobstructed nostril as to produce a decided impediment to respiration, with a sinking in of the tissue above the anterior nares during inspiration, the so-called valve action, it is best to defer "trimming up" the redundant septal thickening until several months have elapsed after the operation, and the redundancy has thoroughly performed its function as a splint to prevent the quadrilateral flap of deflected area returning through the septum to its former deviated position.

It should be noted that the main object of this operation is to secure a better method of overcoming the resiliency of the septum than those previously in vogue. This is secured by the long *quadrilateral* flap. The method of support by overlapping edges is the same as in Sajous, Seiler, and Watson's operation, but is a matter of comparatively little importance, because in wide flaps it is only adequate after the resiliency of the base of such a flap has been destroyed by the most thorough bending.

Describe Roberts' operation for the correction of deflection of the nasal septum.

Roberts makes a long incision, oblique or horizontal, according to requirements, through the septum from back to front through the line of deviation or projection with a knife, and with a chisel through the bony septum if it be deviated. A pin is then thrust through the septum above and in front of the incision. By manipulation of the pin and finger introduced into the obstructed naris, the upper or movable portion of the septum above the cut is brought into the middle line, and held in position by forcing the pin forward through the tissues in such a manner that it crosses the incision. A second pin is sometimes introduced through the skin at the lower portion of the nasal bone parallel to the septum, in order to assist in retaining the parts in position. If the deflection of the septum is a general rather than an abrupt one, Roberts weakens the septum after the primary incision by multiple incisions with Steele's stellate punch, "because the operation will be *useless* unless the incisions are very free so as take away all resiliency of the cartilage."

Describe the Asch operation for deviation of the nasal septum?

Dr. Morris I. Asch, of New York, describes the operation devised by him as follows: "It occurred to me that the vital point to attain in operating for this condition was to destroy the *resiliency* of the cartilage in such a way that when it

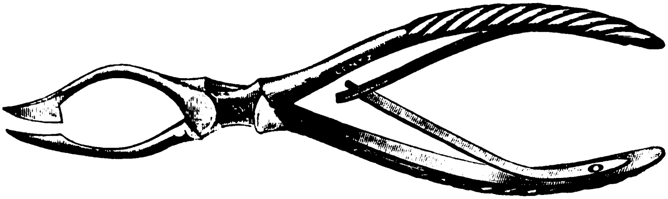

FIG. 72.—Asch's scissors.

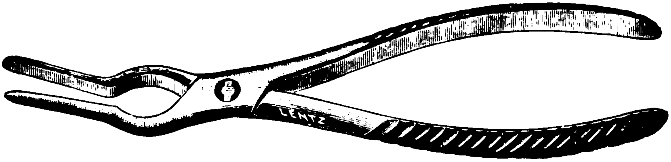

FIG. 73.—Asch's compressing forceps.

should be forced back into its proper position, and held so for a proper length of time, the result would be a straightened septum without any loss of tissue and the re-establishment of the respiratory function of the affected nostril.

"The instruments required for the operation consist of a cutting forceps (Fig. 72), compressing forceps (Fig. 73), blunt and sharp separators (Figs. 74 and 75), to break up any adhesions which may exist between the convex portion of the deviated septum and the inferior turbinated body, and tubular nasal splints made of hard rubber. The cutting forceps or scissors are made in two sizes. They are powerful instruments, curving outward from the point of junction and meeting again in front, one blade is blunt and narrow for introduction into the stenosed nostril, while the other is sharp with a triangular blade. Other scissors (Fig. 76) are made with the blades bent at a right angle, for use in deviations requiring an incision running downward. The compressing forceps used for straightening up the septum after incision are of two sizes with long and short blade respectively. The splints (Fig. 77) are curved hollow tubes made of vulcanite with perforations to prevent them slipping. The tubes first made for me by Tiemann & Co. were oval in shape; later on, at the suggestion of Dr. Emil Mayer, they were flattened on the sides (Fig. 78), and this shape I prefer, as a rule, to the original.

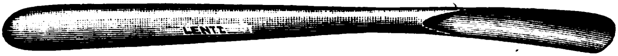

FIG. 74.—Asch's separator, with blunt edge.

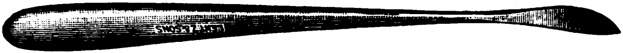

FIG. 75.—Asch's separator, with sharp edge.

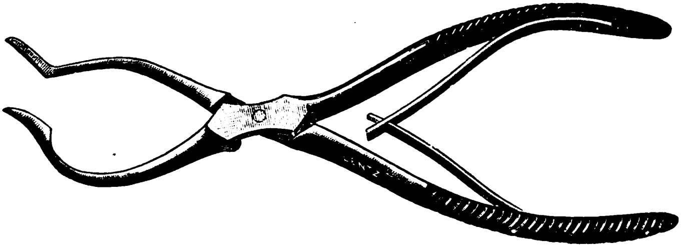

FIG. 76.—Asch's scissors.

An atomizer containing Dobell's solution is kept in a bowl of ice to check any hemorrhage. The operation is performed under complete anesthesia of chloroform, ether, or Schleich's mixture, which has given good results in these cases. All the instruments are to be carefully sterilized, and the nose washed out with an antiseptic spray before operating. The head of the patient being drawn backward over the edge of the table, so that blood will not enter the larynx, and the nostril illuminated either by direct or artificial light; the blunt separator is introduced into the deviated side, so as to break up any adhesions that may exist and to ascertain the presence of any bony obstruction posteriorly, should such be found, the sharp separator can be used, or an ordinary small bone chisel. The scissors are now introduced parallel to the floor of the nose, the sharp blade being in the concavity and the blunt one over the line of greatest convexity of the deviation; it is important that the blades should be at right angle to the septum at the place of incision, otherwise the blades may override and the scissors fail to cut through. The blades being firmly closed, the sharp one cuts through the cartilage into the opposite side with a distinct snap. The scissors are then opened and completely withdrawn. They are immediately reintroduced in the same manner as before, with the blades pointing this time in a vertical direction, crossing the line of the first incision as near as possible at right angles and at its center; the scissors are now closed and the second incision made, after which the scissors are opened and withdrawn. We have thus four segments as the result of the crucial incision. The operator now introduces his finger into the stenosed nostril and forcibly pushes the segments into the concavity of the opposite side, effectually breaking them at their base. The finger should be pushed through. This part of the procedure must be done thoroughly and carefully, for on it depends the success of the operation. If the segments are thoroughly broken at their bases the resiliency of the cartilage is destroyed and the deviation cannot recur. The compressing forceps are now introduced, one blade in

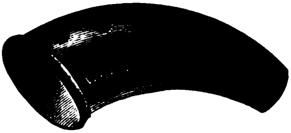

FIG. 77.—Asch tubes.

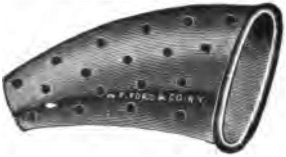

FIG. 78.—Mayer tubes.

each nostril, and the septum compressed in order to straighten it still further and to force the broken segments to more completely override each other. The iced Dobell's solution in the atomizer is now sprayed into the nostrils in order to check the bleeding, and the sterilized tubes introduced, a snugly fitting one into the side previously stenosed and a smaller one in the opposite. These serve to prevent hemorrhage and to hold the septum in its new position. This completes the operation, which in experienced hands should not occupy over five minutes. The patient is now placed in bed, iced cloths applied externally, and a cold antiseptic solution sprayed into the nostrils every half hour. Twenty-four hours after operation the tube in the non-stenosed side is removed and not replaced, the spray and compresses being continued. Twenty-four hours later the tube in the opposite side is removed, thoroughly cleansed and sterilized, the nose is sprayed and cleansed and the tube replaced, cocain being used if necessary. The same tube should be reinserted unless it proves too large for comfort, in which case the next smaller size can be used. This tube must be taken out and cleansed every day by the surgeon while the patient remains in bed, which he should do for at least four days. At the end of this time the nostril is less sensitive, and the patient should be able to extract and reintroduce the tube himself. This is to be done every day for four weeks, coming once a week to the surgeon for observation, and at the end of the time the tube is permanently withdrawn, the septum having now become sufficiently solid to remain in its new position without support. It sometimes happens that the lower segment remains thickened after the tube has been withdrawn, and projects into the nasal cavity; this can easily be rectified by the electrotrephine or galvanic cautery, though if left to itself the thickening will eventually disappear."

What other operations are done for the correction of deviation of the nasal septum?

Kyle, of Philadelphia, makes two horizontal parallel incisions through the deflected area, not involving the mucous membrane of the concave side of the septum, and brings the enclosed area into the median line by means of finger or forceps. Fetterolf has modified Kyle's operation by the use of triangular files (Figs. 79, 80). The operator's finger is inserted into the unobstructed nostril and parallel incisions made with the sharp-edged file (Fig. 79) on the convex surface of the septum, the finger of the operator readily detecting when the cartilage has been cut through to the mucous membrane. If desirable more cartilage can be removed by means of a file truncated on its edge (Fig. 80), in order to avoid wounding the mucous membrane of the concave side of the septum. Two—sometimes three—parallel incisions are made, one just below, one through the center, and one just above the deviation. Sufficient cartilage is removed to completely destroy the resiliency of the septum. Roe, of Rochester, breaks the bony portion of the septal deviation by means of specially constructed forceps of several sizes, the male blades of which fit into a fenestrum in the female blade. By means of these forceps the bone is not merely bent, but is actually fractured, and the resiliency of that portion of the septum destroyed. Killian removes the cartilage and bone of the entire deviated area, preserving the mucous membrane of both sides of the septum. The technic of the operation and the instruments have been greatly improved by Ballinger. In the hands of an expert the operation, although difficult and often tedious, yields excellent results. The formerly deviated portion of the septum is at first, of course, represented by the two layers of mucous membrane that covered it. These probably, in the course of time, will be separated by an appreciable amount of fibrous tissue. Other operations more or less ingenious have been described and employed. They are effectual just in proportion to the thoroughness

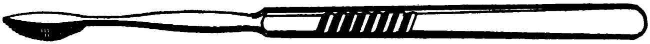

FIG. 79.—Fetterolf's sharp-edged triangular file.

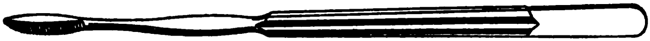

FIG. 80.—Fetterolf's truncate-edged triangular file.

with which the resiliency of the deviated septum is destroyed. All modern operations provide adequately for septal redundancy.

What measures have been adopted for maintaining the deflected area in the median position during the healing process?

In the older operations solid plugs of vulcanite or ivory were sometimes used. Sajous employed a plug of oakum, and pledgets of iodoform gauze or absorbent cotton are sometimes employed at the present time. Roberts probably first employed a steel pin to hold the septum in position after operating. The pin had a square head. Seiler used an ordinary darning needle; Gibbs, a pin with a pear-shaped head; and Watson, a pin with a spear-shaped point, the other end bent into a ring and protected by a piece of thin rubber, through which the pin was thrust before being used. Steel pins may be allowed to remain in the tissues for about ten days; after that time they become so loose that they have to be removed. They cause a certain amount of sloughing of the cartilage, which aids in reducing its resiliency.

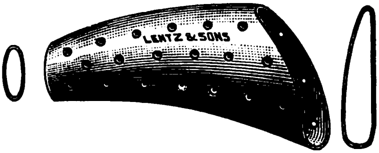

FIG. 81.—Kyle's malleable nasal tube.

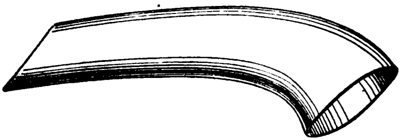

FIG. 82.—Allen's tube.

Asch and Meyer employ vulcanite tubes (Figs. 77 and 78). Berens, of New York, uses a hollow olive-shaped splint of cork, varnished with iodoform collodion. Kyle employs the tube shown in Fig. 81, made of soft malleable metal, so that it readily can be bent or cut into a shape suitable for the nasal condition present. Harrison Allen devised the brass silver-plated tube, shown in Fig. 82. It differs from the other tubes inasmuch as it is prevented from slipping from the nose by the upper portion of its distal extremity, which rests in the hollow space at the tip of the nose. The writer has slightly modified the shape of this tube, and had it made in three sizes, of the same soft malleable metal employed in the Kyle tube. It readily can be cut with a knife or scissors or pressed by the fingers or the handle of an instrument to meet any unusual nasal condition present, should such modification of its shape be necessary in any particular case.

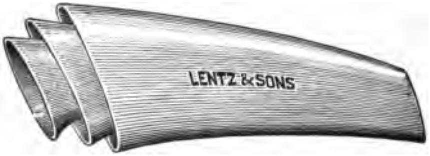

FIG. 83.—Nasal tubes.

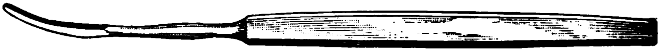

FIG. 84.—Seiler's septum-knife.

DISLOCATION OF THE COLUMNAR CARTILAGE.

What is the columnar cartilage?

It is a small strip of cartilage, part of the lower lateral cartilage of the nose, lying parallel with the lower border of the septum, the purpose of which is to act as a support to the columna.

Describe dislocation of the columnar cartilage.

As ordinarily seen, the lesion consists of the displacement laterally of the distal extremity of the septum in such a manner as nearly to occlude the affected nostril (Fig. 85).

What is the treatment?

The mucous membrane should be incised over the most prominent part of the deformity in such a manner as to allow the excision of a sufficient amount of cartilage to restore the patency of the affected nostril. It is not generally necessary to suture the edges of the incision after the excision of the cartilage. No after-treatment is required.

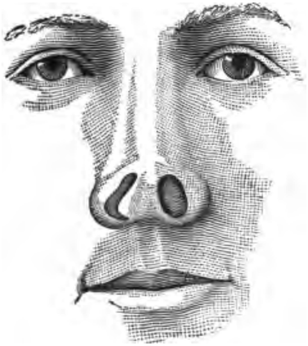

FIG. 85.—Dislocation of the columnar cartilage of the nose into the right nostril (Bosworth).

HEMATOMA OF THE SEPTUM.

What is hematoma of the septum?

An extravasation of blood beneath the mucous membrane of the septum, generally the result of traumatism. It presents itself as a blood-red tumor, sometimes large enough to obstruct nasal respiration.

What is its prognosis?

The blood may be absorbed, or inflammation may occur and an abscess result.

What is its treatment?

If the amount of blood is large, an incision should be made to allow it to escape.

ABSCESS OF THE SEPTUM.

What is the etiology of abscess of the septum?

Abscess of the septum may result from traumatism, syphilis, or phlegmonous inflammation of the septum.

What are its symptoms?

There may be the history of a chill, followed by fever, as in abscess elsewhere. Upon inspection the nose is found to be obstructed by a soft, fluctuating tumor of the septum. Generally the septum is soon perforated, so that the tumor becomes bilateral.

What is the treatment?

Early evacuation of the pus to prevent extensive destruction of the parts involved in the inflammation, and hasten resolution. The incision through the abscess should be sufficiently free to allow of syringing with sublimate solution if deemed necessary, and the patency of the opening should be maintained by the daily passage of a probe or the introduction of a drain of iodoform gauze. If a sequestrum of cartilage or bone form, it should not be removed until completely separated, and extreme care should be exercised to prevent injuring the mucous membrane of the septum, or a perforation of the septum will be present when the healing process is complete.

SUBMUCOUS INFILTRATION OF THE SEPTUM.

What is submucous infiltration of the septum?

Submucous infiltration of the septum is a comparatively frequent accompaniment of chronic rhinitis, consisting of an edematous tumefaction situated on each side of the septum, generally at its posterior portion.

What is its treatment?

If nasal respiration is obstructed, the masses may be scraped from the septum with the nasal curet or cauterized with the galvanocautery.

FOREIGN BODIES IN THE NOSE.

What foreign bodies are sometimes found in the nose?

Children and insane persons occasionally insert into their noses buttons, cherry-stones, beads, beans, twigs, hair-pins, etc. Necrosed bones, when detached, act as foreign bodies and produce their characteristic symptoms. Rhinoliths, ascarides, and maggots are also found in the nose, and may be considered as foreign bodies.

What are the symptoms?

Obstructed nasal respiration proportionate to the size of the foreign body. If the foreign body is large or causes pressure, headache and pain of a neuralgic character are complained of. At first the presence of a small foreign body in the nose of a child attracts but little attention unless the child tells its parent that there is something in its nose. After a time a discharge of glairy mucus occurs, which excoriates the skin of the lips and alæ, but the discharge soon becomes purulent and may be streaked with blood and be fetid. A one-sided discharge from a child's nose is almost pathognomonic of a foreign body, and under such circumstances the most careful and painstaking search should be undertaken to discover the offending particle, which may be a wad of newspaper, a shoe-button, a pebble, or a seed.

What is the treatment?

The foreign body or bodies should be removed as soon as possible. This may be accomplished by means of a pair of forceps or Gross's ear curet. Rhinoliths may sometimes be removed whole, or may have to be broken up by means of a powerful pair of forceps in order to remove them from the nose. Chloroform will kill maggots, and its vapor should be inhaled when maggots are present, and the parts afterward cleansed with an antiseptic solution (Formula 2 or 3).

INJURIES AND DEFORMITIES OF THE BONY FRAMEWORK OF THE NOSE.

What is the most common traumatism of the bony framework of the nose?

By far the most common result of nasal traumatism is dislocation of a portion of the septum from its attachment to the nasal processes of the superior maxillary bones. The dislocation is often overlooked at the time the injury is received because of the profuse hemorrhage. If a surgeon is consulted, his efforts usually are directed to controlling the flow of blood; and often he does not again see his patient for some days or weeks. Then the patient states that he can breathe fairly through one nostril, but not through the other.

Inspection of the nasal cavities shows a bulging area of septum in the obstructed nostril, corresponding to a concavity upon the septum in the opposite nostril. If seen within a week or two of the injury, the parts should be anesthetized by placing pledgets of absorbent cotton saturated with a 4 per cent. solution of cocain in contact with both sides of the deflected area of the septum. After these have remained in place for half an hour the septum will have become more deeply and thoroughly anesthetized than if a stronger solution of cocain were applied for a shorter period. The surgeon, after removing the cotton pledgets, wets with sterile water the forefinger of his right hand, if the patient's left nostril is obstructed, or the left forefinger, if the obstruction is in the patient's right nostril. With the palmar surface toward the septum and a slight boring motion the surgeon's finger is guided along the floor of the patient's nose. As the finger advances, pressure from the finger-tip readily forces the dislocated septum into a position median to both sides of the nose. However, before the finger is withdrawn from the nose, care should be exercised that the posterior area of the dislocation is brought into the median line. Often at about the position of the articulation of the triangular cartilage with the perpendicular plate of the ethmoid there is a sharp ridge, partly fracture of the vomer and partly dislocation of the cartilage, extending upward a little distance from the floor of the nose. The parts producing this vertical ridge, if it exists, should be carefully moulded into the median plane and the tube (Fig. 83) inserted to retain them in place. This tube or nasal splint is made of the same sheet material as that employed for collapsible paint-tubes. Its lateral diameter is readily increased by passing the handle of an instrument through it, and its shape changed by pressure with the fingers or by cutting away the distal or proximal extremity with scissors or knife. The tube is retained in place within the nose by the upper portion of its proximal extremity, which occupies the hollow at the tip of the nose. Hence, in withdrawing the tube, the tip of the nose is first bent a little upward in order to release this portion of the tube. Three sizes of tube are made in order that a tube may be selected that can be moulded to fit accurately the inferior nasal chamber of any nose.

Describe the methods of correcting flattening of the bridge of the nose, or saddle-back nose.

A common result of nasal traumatism is fracture of the nasal bones at the root of the nose. The distal fragments are rotated outward on their long axes and depressed, producing a broadening and flattening of the bridge of the nose. When only one nasal bone is fractured, the tip of the nose is usually turned to one side as the result of dislocation of both lateral upper shield cartilages and the septum. To remedy the former defect Laplace has devised the following operation:

A median incision is made from the frontonasal articulation to the nasal cartilage. The incision is through the skin and cellular tissue only, and does not involve the periosteum. The soft tissues are then dissected subcutaneously on each side, the whole length of the incision, and the dissection is carried as far as the maxillary articulation. A chisel is used in the median line and the two nasal bones are separated from each other by a few blows with the hammer, from the frontal articulation to the nasal cartilage. If necessary, the nasal cartilage may also be separated for a certain distance either by the chisel or by scissors. The chisel is now introduced under the dissected skin on one side, lifting it, and resting the cutting edge of the chisel directly on the nasomaxillary articulation. A few blows with the hammer will separate the nasal bone from the maxillary. This is repeated on the other side. The nasal bones and cartilage now have been loosened from each other and also from the maxillary. Their only bony attachment is to the frontal and ethmoid. This attachment, however, will allow of a certain mobility, which is utilized subsequently to raise the nasal bones and hold them in a new position.

A stout curved needle, armed with a strong ligature, is passed under the loosened nasal bones. The ends of the ligature being brought together, allow the nasal bones being lifted into the desired position. In order to maintain the bones in this new position, a long straight needle armed with strong silver wire is passed directly through the skin under the nasal bones and out through the skin on the other side. The silver wire is now cut, removing the needle, and leaving the double wire in place. If necessary, another such double wire is introduced both above and below, according to the extent of support required. At each place the double wire is twisted together over small pads of iodoform gauze on each side of the nose; each double wire suture being twisted until the proper amount of tension is obtained to maintain the nasal bones in the position into which they were lifted by traction on the silk ligature. This being done, the skin incision in the median line is closed by fine silk sutures.

After two weeks the silver wires are cut, and the pads removed. The nasal bones retain the position given them. No after-treatment is required. Two or three months after the operation the bridge of the nose settles somewhat; but the improvement over the original condition always remains very marked. The median skin incision causes an inconspicuous scar, while the spots on the side, pierced by the silver wire, almost entirely disappear. Laplace has operated on fourteen cases by this method, with excellent results.

A similar result may be obtained by the following method: The patient being etherized to prevent the flow of blood into the pharynx during the operation, the posterior nares are plugged with gauze by the aid of Bellocq's cannula. An incison is then made through the skin into the nose close to the septum at the extremity of the nasal bones. One blade of the writer's nasal cutting forceps (Fig. 86) is then thrust into the nose and the other pushed under the skin in such a direction that when the forceps is closed and locked its edges bite into the suture between the nasal bones and septum. When in position the blades of the forceps are locked, and by slightly rotating the instrument backward and forward the suture parts with an audible snap. The forceps are then withdrawn and the procedure repeated on the other side of the septum. An incision is then made at the anterior-inferior extremity of the nasal bone of one side, and one blade of the forceps introduced into the nose and the other blade beneath the skin. The blades are locked as nearly as possible into the suture between the nasal bones and the nasal processes of the superior maxillary. Backward and forward rotation of the forceps causes the bone to part with a snap, and all resistance to the partial rotation of the forceps ceases. The procedure is repeated on the other side of the nose. The nasal bones are now severed from their attachments except at their base, which also is sometimes fractured by the movements of the forceps. One blade of an Adams forceps is now inserted into the naris and

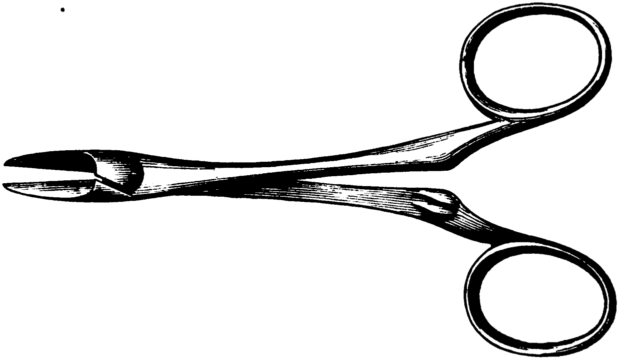

FIG. 86.—The author's nasal bone-cutting forceps.

the loose nasal bone grasped between the flat blades of the instrument. Ordinarily it is easy to rotate the bone upon its long axis in such a manner as to increase the height of the bridge of the nose, and at the same time the bridge of the nose is made more narrow by pressing the anterior-inferior edge of the nasal bone medianly toward the septum. The same procedure is applied to the opposite nasal bone. Steel pins are now inserted into the space between the nasal bones and the nasal processes of the superior maxillary bones and thrust transversely downward through the septum until their points rest upon the floor of the opposite nostril. A few blows from a lead mallet serve to firmly fix them in position. The pins are then cut off one-quarter of an inch above the surface of the skin. They cross where they pass through the septum, and hence assume an X shape, the nasal bones being retained somewhat firmly in position by the upper V of the X. The steel pins should be of considerable size, the ordinary darning needles sold in dry-goods' stores answering a very good purpose. In about ten days to two weeks they beecome loose in the tissues and it may be necessary to remove them.

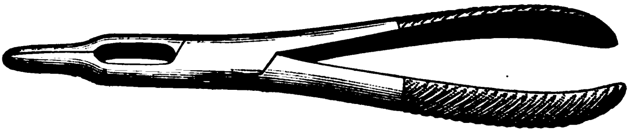

FIG. 87.—Adams' septum-forceps.

When the bridge of the nose is depressed as the result of destruction of the nasal bones from syphilis or other cause, a platinum plate may be inserted beneath the skin of the bridge of the nose. The necessary incision is made inside the mouth at the junction of the upper lip and upper jaw, the lip is stretched upward toward the forehead and the dissection continued until sufficient space has been secured for inserting the plate underneath the skin of the bridge of the nose. Platinum or gold plates inserted into the tissue in this manner are said to generally cause no disturbance and remain in place for years. However, they are liable at any time to ulcerate their way through the skin, and must then, of course, be removed.

Most satisfactory results follow the injection of paraffin beneath the skin into the cellular tissue of the nose. A special paraffin is prepared by mixing with ordinary paraffin white vaselin until the mixture melts at about 110° F. This special paraffin is readily injected at ordinary temperatures through a needle but little larger than an ordinary hypodermic needle by means of the screw syringe (Fig. 88). As the screw is turned the paraffin exudes from the end of the needle in a worm-like thread, readily compressible between the thumb and finger. The paraffin, having been melted in the tin cup showm in Fig. 89, is drawn into the barrel of the syringe, which it completely fills. The end of the syringe where the needle is screwed on is then closed with a screw-cap to prevent the escape of the paraffin, and the syringe with the paraffin it contains and the needle to be used are dropped

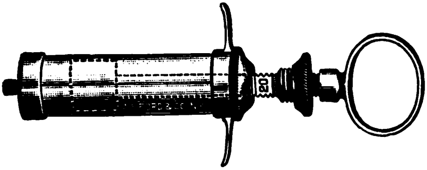

FIG. 88.—Harmon Smith's screw syringe for the subcutaneous injection of paraffin.

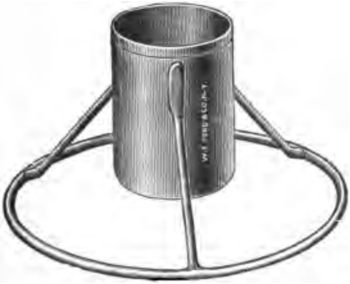

FIG. 89.—Harmon Smith's tin cup for the convenient melting and sterilization of paraffin. The cup, filled with paraffin, is placed with the syringe in the sterilizer and the syringe filled after the paraffin is melted.

into the sterilizer and most carefully sterilized in boiling water. The syringe is then allowed to cool, and the needle screwed into place ready to use.

The patient requires no special preparation other than washing the skin of the nose with green soap, alcohol, and, finally, corrosive sublimate solution 1 : 1000.

The end of the needle is inserted near the tip of the nose, and thrust through the subcutaneous cellular tissue slightly beyond the deformity. Before beginning the injection the operator should assure himself that the point of the syringe-needle lies in the cellular tissue and hence is freely movable.

The screw of the instrument is slowly turned, and as the paraffin is pushed out through the needle it presses aside the cellular tissue and infiltrates it. The paraffin is molded into shape by the thumb and finger of the operator to the exact shape desired. The syringe-needle is then withdrawn a short distance, and more paraffin thrown into the cellular tissue, which is molded into shape; and so on, until the needle is finally withdrawn from beneath the skin of the nose. Before this is done care should be taken to break the thread of paraffin at the needle's point, so that paraffin will not be drawn *into the skin* as the point of the needle passes through it. The thread of paraffin is readily broken by grasping the point of the needle through the skin and rotating the instrument immediately before the needle is withdrawn.

Not more than twenty minims of paraffin should be injected at one sitting, in order to avoid injurious pressure and the cutting off of the circulation sufficiently to cause sloughing. It should be borne in mind that the operation is so simple and painless that it can be repeated as often as necessary to accomplish the desired result, so that it is foolish to attempt too much at one sitting.

Little or no swelling follows the injection, and the after-treatment consists in confining the patient to bed for twenty-four hours as a precaution, and keeping him under observation for some days. Iced cloths or a 25 per cent. solution of aluminum acetate on cloths may be applied if edema or inflammation seem to require it.

Paraffin injections not only push the cellular tissue aside, but infiltrate it to a greater or less extent, so that if too much paraffin is injected it is impossible to remove it without removing the cellular tissue in which it is imbedded. After all inflammation has subsided the mass feels somewhat like a little mass of fat beneath the skin, and is somewhat readily movable upon the bone beneath.

What unfavorable results have been reported from subcutaneous injections of paraffin

Infection followed by slough or abscess. Infection can be avoided by careful sterilization and by care to avoid leaving a cylinder of paraffin extending through the skin to the mass beneath.

Pressure necrosis, produced by injecting too much paraffin at one sitting, or beneath the skin where it is tightly bound down by adhesions.

Deformity from hyperinjection or depositing the paraffin in the wrong place. Ordinary skill, prudence, and the proper technic will prevent such a disaster from occurring.

Several cases of embolism have been reported from the injection of *fluid* vaselin or paraffin. When the paraffin is injected as a solid the danger is less imminent. It will, however, be well to have an assistant compress the sides of the root of the nose between his thumb and forefinger while the injection is being made.

What are the common congenital deformities of the nose?

The most common of the congenital deformities of the nose are a bulbous condition of the end of the nose and extreme prominence of the bridge. The latter is readily removed in the following manner: An incision is made through the skin and periosteum down to the bone. The periosteum is then stripped from the bone and the parts exposed. It is now a comparatively simple matter to remove the redundant bone and cartilage by means of a burr driven by a dental engine. The skin and periosteum are then placed in their former position and the wound brought together by buried sutures, which leave no stitch-marks and a linear scar, which, in a year or two, becomes practically invisible.

When bulbous enlargement of the tip of the nose is excessive the redundant skin and fat is best treated by the method of Rodman of Philadelphia, who removes a wedge-shaped piece of skin and subcutaneous structures, being careful not to disturb the cartilaginous framework of the nose. In cases where the deformity is less pronounced, the operation devised by Roe of Rochester serves every purpose.

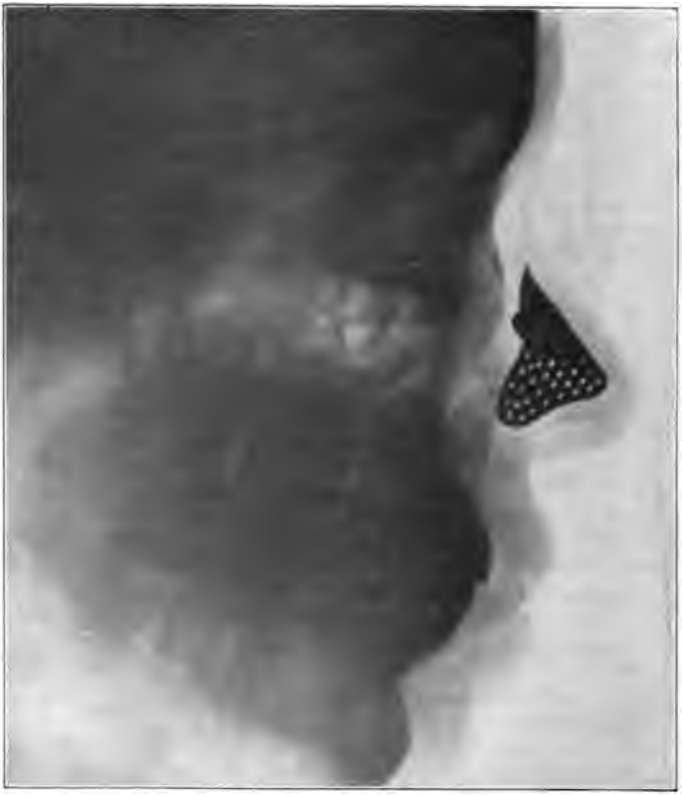

FIG. 90.—*X*-ray photograph of a gold plate beneath the skin of the nose to correct the deformity resulting from syphilitic necrosis of the bridge of the nose (author's case).

The end of the nose is turned upward and backward and held with a retractor by an assistant; then sufficient of the superfluous tissue is removed or dissected out from the inside of the nose to allow the nose to conform to the shape that we desire. Great care must, however, be exercised not to cut through into the skin, lest we may have afterward a scar or dent in the external surface of the nose.

DISEASES OF THE PHARYNX.

What are the principal diseases of the pharynx?

Acute pharyngitis, chronic pharyngitis, follicular pharyngitis, atrophic pharyngitis, syphilitic pharyngitis, membranous pharyngitis, retropharyngeal abscess, tumors, and paralysis of the pharyngeal muscles.

ACUTE PHARYNGITIS.

What is acute pharyngitis?

Acute pharyngitis is an acute inflammation of the mucous membrane and underlying structures of the pharynx.

What other names is it known by?

Acute sore throat; acute pharyngeal catarrh; angina catarrhalis.

What is its etiology?

Acute pharyngitis is generally the result of exposure to wet and cold, especially of persons of the rheumatic diathesis or of debilitated constitutions. It may also result from traumatism or the presence of a foreign body in the pharynx.

What is its pathology?

The inflammation is usually by no means evenly distributed, the glandular elements being always most affected. Their secretion is at first increased, but becomes after a time decreased, starchy, and glue-like in character. The tonsils are always involved to a greater or less extent, their inflammation becoming so great in some instances as to mask the inflammation of adjacent structures, and the affection is then called tonsillitis or quinsy.

What are its symptoms?

The constitutional symptoms are usually trifling, a feeling of lassitude with slight fever. The throat feels sore, dry, and stiff. The symptoms may increase until pain, especially when deglutition is attempted, becomes quite severe. The cervical glands are often swollen and painful to the touch. The voice is usually husky, and a sensation as of a foreign body in the throat keeps the patient hawking and spitting. When the tonsils or larynx are seriously involved in the inflammation certain other symptoms are present, which will be described further on.

What is the treatment?

A saline cathartic should be administered in sufficient quantities to secure one or more free movements of the bowels. A solution of nitrate of silver of the strength of 1 or 2 drams of the salt to 1 ounce of water should be freely painted over the inflamed lateral walls once or twice a day. It should be borne in mind that whilst the application of a weak solution of nitrate of silver to the inflamed fauces and pharynx is painful and acts as an irritant, the application of solutions of the strength of 1 or 2 drams to the ounce of water is not painful, and is immediately followed by a sensation of relief and comfort, and tends to materially shorten the course of the disease. An astringent gargle or lozenge (Formula 31 or 32) should also be prescribed for the patient's use. When acute pharyngitis is the result of the presence of a foreign body, it should, of course, be at once removed, and the inflamed pharynx treated as ordinary acute pharyngitis. When the rheumatic diathesis exists, the administration of guaiac (Formula 33) will be found to yield most excellent results, whilst in gouty sore throat colchicum should be prescribed.

SIMPLE CHRONIC PHARYNGITIS.

What is simple chronic pharyngitis?

Simple chronic pharyngitis is a chronic inflammation of the mucous membrane of the pharynx, generally the result of chronic rhinitis. The disease is often complicated by inflammation of the follicles of the mucous membrane, and is then called follicular pharyngitis.

What other names is it known by?

Chronic sore throat; granular pharyngitis; follicular pharyngitis; chronic angina; relaxed throat; chronic catarrh of the throat; exudative pharyngitis.

What is its treatment?

It is all-important to bring about a cure of the nasal disease to the presence of which the pharyngeal malady is due. After a cure has been brought about of the primary nasal affection, simple chronic pharyngitis will get well almost without treatment. During the treatment of the nasal affection, however, applications should be made to the vault of the pharynx of Formula 10, 11, or 12, in the following manner. A tongue-depressor (Figs. 10–12) should be used to hold down the tongue and the patient requested to try to breathe through his nose, in order to relax the palatine muscles, when the application may be made without difficulty by means of an aluminum applicator, the end of which has been wrapped with cotton and bent to a suitable curve. Should, however, the palate lie closely in contact with the pharyngeal wall, considerable force will be required to carry the end of the applicator into the postnasal space, while most of the solution with which the cotton on the end of the applicator has been saturated will be squeezed out and remain in the fauces. Applications made in such a manner tend rather to increase the existing inflammation than to subdue it, and it is always best to desist from making an application to the pharyngeal vault rather than employ force. When the uvula has become elongated or the mucous membrane of the fauces relaxed, as the result of constant *hawking*, the daily application of the spray from an atomizer containing a solution of sulphate of copper, 2 grains to the ounce of water, will render material assistance in restoring the "relaxed throat" to a condition of health. In rare instances it is necessary to amputate the elongated uvula; but only the relaxed and redundant mucous membrane at the tip of the uvula should be removed. It is rarely or never necessary to remove any of the muscular structure of the organ, and amputation of the entire uvula close up to the soft palate is done only for the removal of malignant disease or as the result of the ignorance or awkwardness of the operator. A description of the best method of operating will be found further on (page 186).

Hypertrophied follicles are not infrequently a source of irritation, and cause frequent coughing and retching. This is particularly the case when a number of inflamed follicles have coalesced so as to form a red, sore, and swollen area of considerable size. If such patches be situated close to the posterior pillars, so that they are rubbed and irritated by these folds of mucous membrane with every motion of the pharyngeal muscles, the sufferings of the patient amount to actual pain.

The irritability of the mucous membrane covering areas of hypertrophied follicles can be decreased by lightly painting with a 60-grain solution of nitrate of silver. However, care should be exercised to prevent the silver solution spreading over the surrounding mucous surface, because strong solutions of silver nitrate are exceedingly irritating when applied to the *posterior* wall of the oropharynx.

With many practitioners the radical destruction of the diseased gland by means of the galvanocautery is a favorite method of treatment. A very small cautery-knife should be selected, and great care should be exercised not to burn too deeply, or the resulting scar will cause more trouble than the original disease. It is unwise to apply the galvanocautery-knife to more than two or three hypertrophied follicles at one time, or the treatment may be followed by a somewhat sharp attack of acute pharyngitis.

Emil Mayer of New York curets away the offending follicles by means of a special curet (Fig. 91). By this method

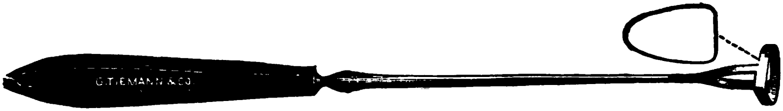

FIG. 91.—Emil Mayer's pharyngeal curet.

of treatment, which is much less painful than the use of the galvanocautery, all the hypertrophied follicles are removed at a single sitting.

ATROPHIC PHARYNGITIS.

What is atrophic pharyngitis?

Atrophic pharyngitis is an atrophic condition of the mucous membrane and submucous tissues of the pharynx.

What other names is it known by?

Pharyngitis sicca; dry pharyngitis.

What is its etiology?

Atrophic pharyngitis generally results from long contact with the irritating discharges of nasal catarrhs. It frequently exists when atrophic rhinitis is present, being probably the result of an extension of the atrophic process to the pharyngeal mucous membrane. A dry condition of the faucial mucous membrane, amounting almost to pharyngitis sicca, is found in all mouth-breathers, but disappears spontaneously as soon as the nose has been rendered sufficiently patulous.

What are the symptoms?

The patient complains of his throat feeling dry and stiff. Upon inspection, the mucous membrane of the throat appears light colored, thin, and as if varnished. Frequently the mucous membrane is so thin that the outline of each cervical vertebræ can be distinguished. Sometimes masses of inspissated mucus, perhaps dark colored from the dust inhaled, and swept into ridges by the motions of the soft palate, are seen adhering to the atrophied mucous membrane.

What is the treatment?

Attention should be mainly directed to the condition of the interior of the nose, because it is the experience of most rhinologists that when a cure of the nasal affection has been brought about, the concomitant throat disease will get well almost without treatment. The general health should receive attention, and, if necessary, tonics should be prescribed; while a sluggish condition of the bowels may indicate the use of saline laxatives. Formula 34 may also be ordered to increase the pharyngeal secretions and diminish reflex symptoms. If atrophic rhinitis has caused the affection, plugs of cotton, previously mentioned as useful in atrophic rhinitis, should be made long enough to project somewhat from the posterior nares into the pharynx, while a weak solution of nitrate of silver (gr. v–xv to the f℥) should be applied to the atrophied mucous membrane, both above and below the soft palate, to stimulate the atrophied glands to increased secretion, and bring about renewed growth of the atrophied structures.

SYPHILITIC PHARYNGITIS.

What is syphilitic pharyngitis?

Syphilitic pharyngitis is an inflammation of the pharynx due to the presence in the system of the syphilitic poison.

What manifestations of syphilis are commonly met with in the pharynx and fauces?

The primary sore is not infrequently seen. Mucous patches are by no means rare, while gummata or their characteristic cicatrices are very often met with in the pharynx, especially in dispensary practice.

What are the symptoms?

In primary syphilis, examination shows a whitish abrasion, soon followed by swelling of the glands about the angle of the jaw. Secondary lesions may present either the form of mucous patches or erythema, characterized by a diffuse redness of the entire fauces, or more commonly, in the milder attacks, by a broad red line extending upward upon each of the anterior pillars, and ending abruptly and symmetrically at the root of the uvula. These red lines are almost pathognomonic of syphilis, and persist for a long time after other secondary lesions have disappeared. In secondary syphilis the larynx almost always becomes involved, so that the voice is hoarse, and there is present a short cough of a peculiar metallic character, which once heard and recognized, is rarely forgotten. Mucous patches and erythematous patches in the throat are almost always symmetrical; that is, both sides of the throat are attacked in corresponding localities by similar lesions, while tertiary lesions do not as frequently present this symmetry. Gummata more frequently involve the tonsils or soft palate than other parts of the throat. A gumma may be absorbed under treatment, or breaking down, result in a rapidly spreading ulceration. When an ulcerating gumma is situated upon the posterior wall of the pharynx, the cervical vertebræ, or even the cervical cord itself may finally become involved, and a fatal issue result. In such cases also the utmost care is required to prevent union of the soft palate and uvula to the pharyngeal wall, when the ulceration has also involved the posterior surface of the palate. Where union has actually taken place, it is almost impossible at any subsequent period to permanently restore satisfactory communication between the oropharynx and nasopharynx by any operation, because of cicatricial contraction after the operation.

What is the treatment?

In pharyngeal syphilis, as in syphilis elsewhere, constitutional treatment is of primary importance, and the same remedies may be employed internally, as already recommended in the treatment of nasal syphilis (Formulas 26, 27, 28, 38). If the symptoms are urgent, the hypodermic method of administering mercury should be employed, as it gives the most speedy results. Local treatment consists in maintaining perfect cleanliness of the diseased parts, and stimulating mucous patches and ulcerations to heal by daily applications of the acid nitrate of mercury, diluted with five parts of water, and the application, by means of the powder-blower, of a small quantity of Formula 21 or 22, if ulcerations are extensive and deep.

Painting superficial ulcerations with acid nitrate of mercury yields most gratifying results as far as speedy healing is concerned; but as the application of this remedy, even after cocainization and when diluted with 5 parts of water, causes severe pain, it should be employed with great care. In cases not too urgent, when the patient complains of the pain, it is judicious to substitute touching the patches or ulcerations with nitrate of silver, 60 grains to the ounce. This remedy is sedative, and serves to allay local inflammation during the time that the internal treatment is bringing about a cure.

MYCOSIS OF THE PHARYNX.

What is mycosis of the pharynx?

It is a parasitic disease involving in most cases the faucial, pharyngeal, and lingual tonsils, although other parts of the pharyngeal mucous membrane do entirely escape in some instances. It is characterized by little white, conical elevations, sometimes as large as a grain of rice, due to the presence of fungi of the class mycosis, most frequently the leptothrix buccalis.

What is the etiology?

Leptothrix is so frequently found in the secretions of the mouth that it might almost be termed a normal constituent. It is especially prevalent in the mouths of individuals with carious teeth, accumulations of tartar, etc. Why it should in some individuals cause the horny, chalk-white growths characteristic of mycosis is not well understood.

What is the pathology?

Leptothrix penetrates the lacunæ of the tonsils and the glands of the mucous membrane of the pharynx. Multiplication of the threads takes place, so that they grow through the epithelial cells and appear on the free surface of the mucous membrane, where they appear as whitish masses, generally cone-shaped, the base of the cones adhering tightly to the mucous membrane and their apices projecting into the pharynx. Under the microscope the cones are seen to consist of granular material, a few epithelial cells, and numerous threads of leptothrix. These threads when stained are seen to be jointed and contain numerous spores.

What are the symptoms?

A few masses of leptothrix may be present in the pharynx without causing any symptoms whatsoever. Under such circumstances the masses may be discovered, usually upon the tonsils, while examining the throat of a patient. Usually, however, patients with leptothrix complain of a tickling sensation in the pharynx and spasmodic cough.

What is the treatment?

On the tonsils and other easily accessible portions of the pharynx the little masses should be grasped one by one and pulled off. They are attached somewhat firmly, and considerable force and a suitable forceps is necessary to remove them. The smallest size of Farnham's alligator-forceps or, better, Hartman's ear forceps, a smaller curette forceps made on the same plan as Farnham's forceps, answers the purpose better than most, because so firmly adherent are the little masses that they are apt to slip from the grasp of forceps with smooth jaws. After the removal of the little masses the mucous membrane where they grew should be brushed with nitrate of silver, 60 grains to the ounce of water. In inaccessible localities, like the base of the tongue and beneath the epiglottis, leptothrix is better attacked with the galvanocautery knife rather than the forceps. A very small knife, suitably curved, should be selected, and the current should be powerful enough to instantly heat the very small platinum wire white hot, when it is applied to the leptothrix cone, and destroy it before the heat has time to burn the surrounding mucous membrane by radiation, as would be the case if a larger wire, heated only red hot, were used.

As only a limited number of leptothrix cones can be destroyed at a sitting, the treatment in cases where they are very numerous is necessarily somewhat tedious. Some of the cones re-form after their removal. Applications of silver nitrate, 60 grains to the ounce, prevents this to a considerable extent, and occasionally when applied to the surface where leptothrix is growing will cause the cones to disappear after frequent applications. Occasionally the growths apparently disappear spontaneously.

RETROPHARYNGEAL ABSCESS.

What is retropharyngeal abscess?

Retropharyngeal abscess is an abscess of the posterior pharyngeal wall. It may be hidden above and behind the soft palate, and require the rhinoscope to ascertain its outline; it may be situated opposite the larynx, and only be seen in its entirety with the laryngoscope, or it may be situated in such a manner as to be hidden by one of the posterior pillars of the pharynx. However, the most common seat of abscess is the posterior wall of the pharynx opposite the oral cavity on one side or the other of the median line.

What is its etiology?

Abscess may occur as the result of phlegmonous inflammation of the cellular tissue of the pharynx, scrofula and syphilis being predisposing causes. Traumatism and necrosis of the vertebræ are, however, common causes of the affection.

What are its symptoms?

There is usually but slight systemic disturbance. Chilly sensations may perhaps be complained of; but local symptoms are usually the first to attract attention. When the abscess is situated high up upon the pharyngeal wall, a sensation as of a foreign body causes almost constant hawking and spitting, while there may be present obstructed nasal respiration with more or less pain and tinnitus. When the abscess is opposite the larynx, dyspnea is a marked symptom, appearing in "spasms" which may endanger the patient's life, while swallowing of liquids or solids is dangerous, owing to their frequent passage into the larynx. An abscess in the pharyngeal wall opposite the oral cavity presents none of these symptoms unless very large. Left to itself, a retropharyngeal abscess will discharge itself either into the throat or at some more remote point; but should be aspirated as soon as a diagnosis is made, by means of a curved aspirator needle. Should the pus recur, an incision should be made into the abscess at its lowest part, and the opening maintained patulous by the daily passage of a probe through it for as many days as are necessary to bring about a cure of the affection.

What is the prognosis?

The prognosis is favorable except in those cases where the spinal vertebræ are involved. In all operations upon the posterior wall of the pharynx it should be borne in mind that a large artery is occasionally found in this position, probably the vertebral, which sometimes enters its osseofibrous canal as high up as the fourth or even second vertebra. It has been seen to leave its canal at the third vertebra, to re-enter it at the atlas.

TUMORS.

What tumors are found in the pharynx?

Any of the varieties of tumor found in other parts of the body may occur in the pharynx. They are most frequently located in the lateral walls and may involve the surrounding structures. In the following order of frequency there are found in the pharynx gumma, sarcoma, carcinoma, lupus, papilloma, cyst, fibroma, osteoma, enchondroma, adenoma, and aneurism.

What are the symptoms?

When the growth is large, it may become an obstruction to deglutition or even respiration. In carcinoma and ulcerating lupus, pain is also present, which in many instances radiates into one ear.

What is the treatment?

Except in the case of gumma, the treatment of which has been already described, early extirpation with the knife, galvanocautery, or snare should be practised.

PARALYSIS OF THE PHARYNX.

What is the etiology of paralysis of the pharynx?

Paralysis of the pharynx may result from diphtheria or syphilis, or be the result of a cerebral affection involving the nerves that supply the pharyngeal muscles. Transient paralysis of the palate, either unilateral or bilateral, is common as the result of diphtheria; more rarely are the pharyngeal muscles also paralyzed in severe cases.

What is its pathology?

One or both sides of the pharynx may be involved, and one or all three of the pharyngeal constrictors be paralyzed, as well as the velum palati; but paralysis of the soft palate, either unilateral or bilateral, occurs independently as a "reflex" in ethmoiditis.

What are the symptoms?

Difficult deglutition; liquids being more easily swallowed than solids, but more frequently passing into the larynx; or, when the soft palate is also paralyzed, both solids and fluids may be forced into the posterior nares through the efforts of the tongue to assist deglutition

What is the treatment?

The central cause of the affection should be carefully sought and treated. In suitable cases, strychnin in gradually increasing doses until the limit of toleration has been reached, will do good; while arsenic and tonics are especially valuable where the paralysis is of diphtheritic origin.

FOREIGN BODIES IN THE PHARYNX.

What two classes of foreign bodies are found in the pharynx?

First, those whose bulk does not allow them to pass through the esophagus, and secondly, sharp-pointed objects, like pins, needles, fish-bones, etc., that are forced into the pharyngeal walls by contraction of the constrictor muscles.

What are the symptoms?

Large objects may cause death by holding down the epiglottis. Sharp-pointed objects cause a pricking sensation, sometimes felt at two places in the pharynx, as in the case of a pin or needle. Localized spots of inflammation, when situated low down upon the pharyngeal wall, give rise to the sensation of a foreign body, and this fact, as well as the imaginary foreign body of hysterical women, should be remembered after an unsuccessful search for a foreign substance in the pharynx. However, in the larger proportion of these so-called hysterical cases some lesion will be found to account for the symptoms, if the pharynx be carefully inspected. The most common lesion is a herpetic papule or erosion at the root of the tongue, on either side of the pharynx, posterior to the posterior pillar, or in any other position where two folds of mucous membrane rub together in deglutition.

What is the treatment?

It is not always possible to use the laryngoscope to advantage when the foreign body is situated low down in the pharynx, and in such cases the finger should be introduced into the pharynx, and if a foreign body be felt an effort should be made to scratch it loose with the finger-nail and withdraw it. When the offending substance can be seen, a pair of forceps, either straight or curved, according to its position, should be used to withdraw it (Fig. 92). It should be remembered that after the removal of a foreign body a sensation as of its presence remains for some days.

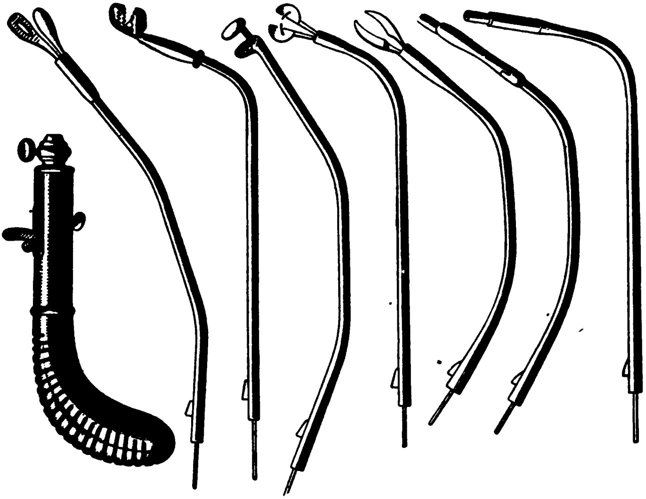

FIG. 92.—Schroeter's forceps.

THE TONSILS.

What are the tonsils?

The tonsils are a part of an irregular ring of adenoid tissue surrounding the pharynx, and continuous with the general lymphatic system. There are seven tonsils; the faucial tonsils, the tubal tonsils, the pharyngeal tonsil, and the lingual tonsils. The faucial tonsils are situated one on each side of the fauces between the anterior and posterior pillars of the fauces. The lingual tonsils are situated at the base of the tongue, the tubal tonsils at the pharyngeal Eustachian orifices, and the pharyngeal tonsil in the vault of the pharynx posterior to the nasal orifices. Any of these tonsils when hypertrophied may cause annoying symptoms, especially the third or pharyngeal tonsil or adenoid vegetations.

What are the functions of the tonsils

Their functions are similar to those of other lymphatic glands. As a part of the hemopoietic system they form young leukocytes, most of which pass into the circulation, but some escape into the free mucous surface, where they may exercise a phagocytic action. They also excite old leukocytes, which probably carry off with them effete products.

The tonsils are most active during youth while the thymus, a large blood-forming gland, is atrophying. There is considerable difference of opinion as to the phagocytic action of the tonsils, some authorities claiming that they are not even able to protect themselves, and that the tonsils constitute a weak part of the throat and expose the system to the inroads of diphtheria, tuberculosis, syphilis, and other diseases.

The lingual tonsil is most apt to prove troublesome as the result of hypertrophy after middle life if at all, while hypertrophy of the faucial and pharyngeal tonsils are distinctly diseases of childhood.

ACUTE TONSILLITIS.

What is acute tonsillitis?

Acute tonsillitis is an inflammation of the tonsils and adjacent structures. There are two common varieties, the croupous and the phlegmonous.

What other names is it known by?

Quinsy; amygdalitis; cynanche tonsillaris; angina tonsillaris; angina faucium; follicular tonsillitis; croupous tonsillitis.

What is its etiology?

The croupous variety of the disease is the result of infection, the disease being infectious, but probably not contagious. The phlegmonous variety is apparently often the result of exposure to cold and wet; but a person who has once had the affection is rendered more liable to subsequent attacks. Recurrent attacks of peritonsillitis are often the result of chronic inflammation of the tonsils, with or without hypertrophy. The cheesy secretion that is retained within the crypts under such circumstances becomes from time to time a source of infection and inoculates either the tonsillar structure itself or, more frequently, the surrounding cellular tissue. Deposits of fetid material between the tonsil and the anterior pillar, when the tonsil is partially adherent to it, also are capable of inoculating the adjacent cellular tissue and causing recurrent attacks of peritonsillar abscess. For these reasons excision of hypertrophied tonsils is not always followed by a cessation of recurrent attacks of quinsy, unless, after the excision, care is taken to destroy with the galvanocautery-knife all crypts that may remain in the stump of the tonsil, and dissect the latter loose from the faucial pillars, should it be adherent, in order to destroy all receptacles capable of retaining putrid secretions.

However, recurrent quinsy occurs in individuals who between the attacks have apparently normal tonsils. In such cases the rheumatic and gouty diathesis also plays its part in the production of an attack of acute tonsillitis. Phlegmonous tonsillitis is a disease of adolescence and early adult life, and does not very frequently attack individuals who are over thirty-five years of age.

What is its pathology?

The inflammation may be only superficial (erythematous tonsillitis), or may involve the parenchyma of the gland (parenchymatous tonsillitis). When the inflammation is deep-seated, an abscess may occur either in the tonsil or more frequently in the cellular tissue about the tonsil, but the brunt of the inflammation is frequently borne by the crypts of the tonsils, which pour out an abundant fibrinous secretion, which, adhering to the surface of the tonsil, presents somewhat the appearance of a diphtheritic membrane (croupous tonsillitis.

What is the diagnosis?

By croupous tonsillitis is meant an inflammation of the tonsil originating in the crypts and accompanied by the formation of a pseudomembrane which, at first confined to the neighborhood of the crypts, often finally extends over the entire tonsil or tonsils, if both be involved. In typical cases occurring in *adults* there is usually no difficulty in distinguishing by the unaided eye the difference between such a membrane and the more yellowish, thicker, and sometimes seminecrotic membrane of diphtheria. The croupous membrane is thin, white, perhaps opalescent, and can somewhat readily be wiped away, a small piece at a time, by means of a cotton-tipped probe. Ordinarily it does not extend beyond the tonsils.

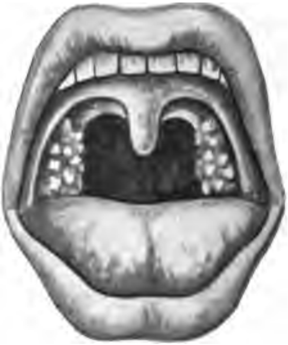

FIG. 93.—Follicular tonsillitis.

In some instances, however, in the case of young children, diagnosis by the unaided eye between the two affections is by no means easy. The struggles of the child allow only a momentary glance at the parts and for the same reason some bleeding may occur in the effort to remove a part of the membrane. Occasionally in such cases a thin opalescent patch occurs upon the anterior pillars or elsewhere in the neighborhood of the tonsil, whose appearance is very deceptive.

Ordinarily the temperature is higher in croupous or follicular tonsillitis than in diphtheria, but some cases, after a temperature of 103° F. or thereabouts for the first twenty-four hours, assume the characteristic lower temperature of mild diphtheria. In rare instances *albuminuria* occurs during an attack of croupous tonsillitis in children, and several competent observers have reported cases of croupous tonsillitis followed by *paralysis* of the soft palate.

Rare in the adult, at least a croupy cough is to be expected in young children with follicular tonsillitis, and sufficient laryngeal stenosis to require intubation is not impossible.

The disease is undoubtedly infectious, but some doubt exists as to its being contagious. Under the microscope several varieties of bacteria are often found in the pseudomembrane, the most constant being the streptococcus. As the streptococcus and other varieties of bacteria sometimes exist in the superficial layer of diphtheritic membranes and mask the presence of the Klebs-Löffler bacillus, which is present in the deeper parts of the pseudomembrane, even culture-tests are not always reliable as a means of diagnosis.

What are its symptoms?

Both in croupous and phlegmonous tonsillitis dryness and stiffness in the throat is first noticed, soon followed by dysphagia. There is a chill or chilly sensations, and pain in the legs and back, headache, and fever. As the disease progresses, the sufferings of the patient become severe. The dryness of the throat causes frequent attempts at swallowing saliva, which are exceedingly painful. The mouth can be opened only with pain and difficulty, and speech becomes almost unintelligible. The tongue is heavily coated and the breath intolerably fetid. The hearing is frequently blunted from extension of the disease to the Eustachian tubes, and abscess of the ear sometimes results, while nasal breathing is usually entirely abolished. The fever, pain, and difficulty of swallowing become greater and greater if an abscess is forming, and the relief is proportionately great after it has opened. As the patient expectorates the pus, he feels almost well, so great is the sense of relief, the fever and pain subsiding together.

What is the treatment?

A thorough application of a solution of nitrate of silver, of the strength of 1 or 2 drams to the fluidounce of water, almost invariably aborts the attack, if applied early, and the inflammation is superficial. The silver solution should be freely painted upon the tonsils and adjacent inflamed mucous membrane by means of a swab of cotton. The relief experienced by the patient as the result of the application is almost instantaneous, and the application should be repeated once or twice a day, until all inflammatory symptoms have subsided. The nares and pharynx should be washed by means of a spray from an atomizer containing a detergent solution (Formulas 1 and 2) before making these applications, and Formula 32 or 44 may be prescribed for the patient's use in the intervals between the applications. It is best also to open the patient's bowels thoroughly at the commencement of an attack by means of a saline cathartic. When these measures do not succeed in aborting the attack, but the fever and suffering of the patient are constantly increasing, aconite in drop doses of the tincture every hour or every two hours will give most excellent results. When pus has formed the abscess should be opened.

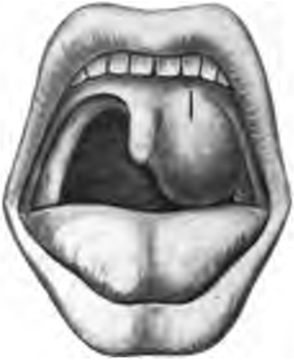

FIG. 94.—Phlegmonous tonsillitis. The black line represents the so-called point of election for puncturing a peritonsillar abscess.

The surgeon should carefully search for fluctuation by means of his forefinger introduced into the patient's mouth. As the abscess is almost always peritonsillar, a fluctuating area is most commonly felt through the anterior pillar *above* the tonsil. Into this place, the so-called point of election (Fig. 94), a small bistoury or, better, the spear-pointed knife used in puncturing the ear-drum, should be carefully thrust with the blade vertical, in order to avoid as far as possible cutting any large vessel that may occupy an anomalous position in this region. If a sudden secession of resistance indicates that an abscess cavity has been penetrated, the blades of a pair of angular scissors or forceps should be introduced and the puncture stretched open until the pus has escaped. If necessary the opening may be enlarged by cutting downward with a probe-pointed knife. The cavity may then be washed out with sterile water. The escape of pus is followed by immediate and great relief and all symptoms usually quickly subside. Even when no pus escapes from the incision, the bleeding affords a certain amount of relief and may bring about resolution of the inflammation. The surgeon, therefore, should not hesitate to puncture a hardened, but not fluctuating, mass at the so-called point of election, as the procedure is usually followed by satisfactory results in cases where no pus is encountered.

Occasionally when the tonsils are adherent to the anterior or posterior pillars of the fauces an abscess will form between the tonsil and the pillar. Under such circumstances if a suspicious hardness is felt either in front or behind the tonsil, it should be separated from their pillar by means of a bent probe, an ordinary strabismus-hook being useful for this purpose. The procedure is sometimes followed by an escape of pus.

In the case of adults the writer has in many instances aborted follicular tonsillitis by the following method: Each affected crypt was in turn washed out with peroxid of hydrogen, by means of a Blake's middle-ear cannula screwed on to a hypodermic syringe. The curved tip of the cannula employed is about one-half inch in length and capable of reaching to the bottom of the follicle. Only a drop or two of the peroxid is injected at one time, but the process is repeated until all of the exudate has disappeared. A fine Allen's probe with a few fibers of cotton wrapped about its end is then bent at an appropriate angle, and, after being dipped into a solution of nitrate of silver, one dram to the ounce, is carried to the bottom of a follicle and the process repeated until each of the affected crypts have received the silver solution. The surface of the tonsil is then painted with the same solution. The treatment is followed immediately by a sense of relief and comfort, and the difficulty in swallowing is in a great measure alleviated. The process may be repeated two or three times a day, and in successful cases brings about a cure at the end of the second or third day.

In cases of children or in adults, when as the result of timidity or excessive irritability of the fauces, this method is not applicable, spraying the parts with peroxid of hydrogen and the application of a 60-grain solution of nitrate of silver suffices for the local treatment, and is far superior to the application of more irritating substances, even in cases suspected of being diphtheria; although in this connection it should be borne in mind that the mucous membrane covering the pillars and the tonsils is scarcely more irritable than that of the mouth—a fact that can easily be verified by experiment, and which those who discountenance the use of peroxid and solutions of iron, etc., on account of their irritating qualities are apparently not aware. A 60-grain solution of silver carefully applied to the tonsils occasions little or no discomfort in health, and when the mucous membrane of this region is inflamed the solution apparently acts as a sedative and its application is followed by a sense of relief and comfort. This, however, is by no means true of the mucous membrane covering the posterior wall of the pharynx, and care should be exercised not to irritate it by the application of the silver solution.

CHRONIC INFLAMMATION OF THE TONSILS WITHOUT HYPERTROPHY.

Describe chronic inflammation of the tonsils without hypertrophy.

The condition is characterized by a feeling of fulness and discomfort in the region of the tonsils. Upon inspection, the tonsils, although not hypertrophied, are redder than normal, and many of the crypts are filled with a cheesy exudate. The neighboring lymphatics are usually enlarged and generally tender to the touch.

What is the treatment?

The cheesy exudate should be carefully removed from the crypts, and a saturated solution of iodin applied to the interior of each crypt by means of a few shreds of absorbent cotton wrapped about the end of a fine probe which is bent at a right angle. Should biweekly applications of iodin in this manner to the interior of the crypts not prove successful, a fine galvanocautery-knife should be inserted while cold into such of the crypts as resist treatment, and whilst *in situ* sufficiently heated to destroy the secreting surfaces and burn through the tissues to the surface. In cases where the crypts are very deep, cutting through to the surface of the tonsil is a somewhat painful procedure, and Makuen's knives (Fig. 95) had better be used for the purpose, after which the wound should be seared with the galvanocautery to prevent its re-uniting during the healing process. Makuen's instruments are also convenient for dissecting loose the tonsil when adherent to the faucial pillars.

The cheesy secretions can readily be removed by directing against the mouth of the crypt a current of air from an air-compressor. Under such circumstances the little masses are blown out of the crypts with considerable force, and sometimes strike the opposite side of the pharynx. The air-current can be conveyed to the surface of the tonsil by means of a small-sized Eustachian catheter or other small tube fitted upon the automatic cut-off (Fig. 35).

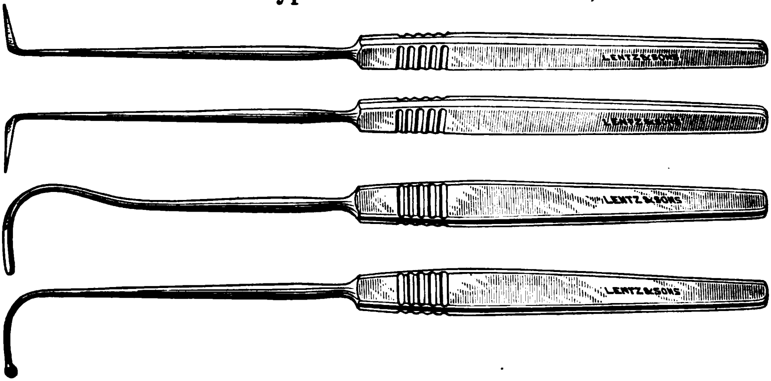

FIG. 95.—Set of tonsil instruments (Makuen's), consisting of two knives (right and left), one probe, and one curet.

What is cyst of the tonsil?

Occasionally the tonsil becomes the seat of cystic disease. Usually the cyst is small in size, but sometimes it may be of sufficient capacity to contain half a dram of milky fluid or the contents of the cyst may be of cheesy consistency.

What is the treatment?

The anterior wall of the cyst should be excised, and its interior painted with saturated tincture of iodin.

CHRONIC INFLAMMATION WITH HYPERTROPHY OF THE TONSILS.

What three varieties of chronic hypertrophy of the tonsils are met with in practice?

First, the ordinary soft hypertrophy of the tonsils found in children and young adults. Second, the so-called ragged tonsil, the result of frequent abscesses, which have caused the sloughing away of a portion of the glandular mass; and, thirdly, the scirrhous or hard tonsil, which is characterized by an enormous increase of the connective tissue of the gland and a canalicularization of its blood-vessels.

What are the symptoms?

There is generally more or less obstruction to breathing: the patient snoring during sleep. The articularization is what is termed thick, and there may be some difficulty in swallowing, especially in the cases of young children. The crypts of the tonsil may become filled with cheesy masses, which, undergoing putrefaction, imparts to the breath an offensive odor. Hypertrophied tonsils also sometimes interfere with the proper performance of the functions of the Eustachian tubes and thus are the cause of aural catarrh and deafness.

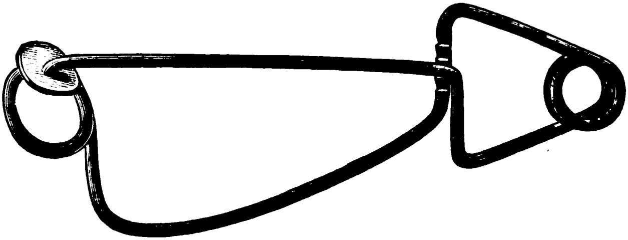

FIG. 96.—Goodwillie's tonsil-compressor.

What is the treatment?

Removal of the major portion of the hypertrophied gland, either with the tonsillotome or snare or by means of the galvanocautery. Occasionally the operation with the tonsillotome is followed by dangerous hemorrhage. Under such circumstances Goodwillie's tonsil-compressor (Fig. 96) will be found convenient for temporarily controlling the hemorrhage until, if necessary, more effective measures can be carried out. Care should be taken not to wound the anterior pillar of the fauces, as it contains a small artery which, when wounded, gives rise to troublesome bleeding. Therefore, when the anterior pillar is adherent to the tonsil, it should be carefully separated from it by means of a probe and Makuen's knife. When from any cause it is undesirable to use the tonsillotome, the wire snare of Jarvis (Fig. 46) can sometimes be used to advantage, but the operation is then much more painful and tedious than when the tonsillotome is used. Scirrhous tonsils should not be removed with the tonsillotome, as, owing to the canalicularization of the blood-vessels, a wounded artery cannot contract, and the hemorrhage is usually long continued, and may be profuse and alarming. Hence, hard tonsils are most safely removed by means of the Jarvis snare or the galvanocautery snare. The hot wire severs the tonsil almost as quickly as the tonsillotome, but leaves a burned surface that is painful and somewhat slow to heal.

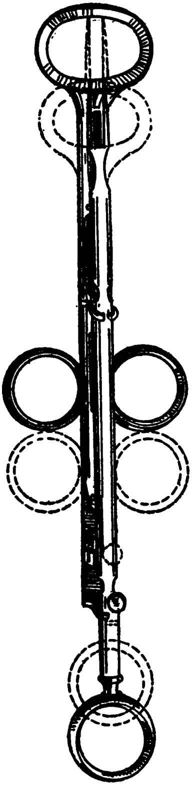

FIG. 97.—Ermold's tonsillotome.

Should an artery be observed to spurt after an operation upon the tonsils, the bleeding spot should be pierced with a tenaculum, by twisting which a sufficient amount of torsion can usually be made upon the tissues to stop the hemorrhage, or the artery can usually be seized by long-bladed hemostatic forceps, and the bleeding stopped by compression or torsion.

In cases of long-continued oozing of blood from the cut surface of the tonsil, Formula 35 may frequently be used with success to control it, or the solid stick of nitrate of silver may be rubbed over the bleeding surface.

The operation with the galvanocautery is performed in the following manner: a small galvanocautery-knife is introduced, cold, into one of the crypts of the tonsils, and being heated while *in situ*, is made to burn its way out. Two or three such burns may be made, at a sitting, upon a tonsil, and will be followed by considerable shrinking of the hypertrophied gland. But one of the tonsils should be operated upon with the galvanocautery at any one time, and from five to fifteen such operations are required to reduce the gland to satisfactory dimensions. Hypertrophied tonsils may also be reduced in size by inserting iodin within the crypts by means of a slender probe whose end is bent at a right angle and wrapped with a minute portion of absorbent cotton dipped into a paste consisting of iodin crystals pulverized with a small amount of glycerin. The bent end of the probe, with the cotton wrapped about it, should be so slender as to readily enter each crypt. This application of iodin, which should be made at intervals of three or four days, often brings about a rapid absorption of the hypertrophy.

Describe the operation of removing the tonsils with the tonsillotome.

The patient, if a child, should be seated in the lap of an assistant, who holds the child's legs between his own to prevent struggling. The assistant then passes his arms under the child's arms, and grasps the child's forehead with his two hands in such a manner as to control the movements of the child's head. When the assistant elevates his elbows the child's arms are extended in such a manner as to prevent the child reaching his face with his hands and interfering with the operation.

The tonsillotome is introduced into the child's mouth flatwise, like a tongue-depressor, and serves to hold down the root of the tongue and afford a good view of the lower border of the tonsil. The ring of the tonsillotome is now passed around the tonsil from below, in order to be sure that the lower border of the tonsil is encircled by the ring, which is pressed firmly against the wall of the pharynx. The blades of the instrument are now closed, and tonsillotome and tonsil removed together from the mouth. If the operator is provided with two tonsillotomes it is generally feasible to remove the second tonsil before releasing the child, unless bleeding is excessive to a degree to interfere with a view of the fauces.

The operator should be provided with a set of at least three tonsillotomes, in order that he may select one with a ring of just sufficient size to snugly fit around the tonsil to be removed. After encircling the tonsil, the instrument should be closed somewhat deliberately, and the operator should be careful to make no effort to remove the tonsillotome from the mouth until the tonsil has been completely severed. It should be borne in mind that the tonsils are not very sensitive. Indeed, they can be touched with the red-hot cautery knife without causing much pain. The operation, therefore, is not especially painful, and probably causes less discomfort to the patient than the administration of ether, which, of course, if used, adds an increased risk to the operation. However, there is no great objection to administering ether for tonsillotomy. Under such circumstances the tonsils are removed with the child's head turned to one side and hanging over the end of the table, to prevent as far as possible the flow of blood into the larynx.

ELONGATION OF THE UVULA.

What varieties of elongated uvula are there?

The whole mass of the uvula may be hypertrophied, or the organ may be dropsical. More frequently, however, merely the mucous membrane is relaxed and hangs as a conical tip below the uvula proper. In rare cases a warty growth is attached to the end of the elongated uvula.

What is its etiology?

It is generally the result of chronic pharyngitis, the constant hawking to dislodge masses of mucus from the pharynx having a tendency to cause the affection. Paralysis of the palate is a frequent symptom in ethmoiditis, and in such cases paralysis of the azygos uvulæ muscles and consequent elongation of the uvula are concomitant with the affection.

What are the symptoms?

Patients complain of "a tickling in their throats." The elongated uvula hanging in contact with the base of the tongue causes an almost constant short cough as an effort to dislodge a supposed foreign substance. These efforts are sometimes persisted in until nausea and vomiting result. Snoring is usually marked and the sleep is disturbed by dreams.

What is the treatment?

The redundant portion of the uvula should be amputated if necessary (see page 163). The operation is perhaps best done in the following manner: The uvula is grasped with a pair of long-nosed hemostats and clamped at a point just below where it is decided to amputate. The uvula is stretched well forward and cut off close to the forceps by a single cut of a pair of somewhat heavy scissors, curved upon the flat, and held with their concavity upward in such a manner that the uvula is cut somewhat obliquely upward; and the wound being upon the posterior surface, is protected from contact with food during the healing process. Generally there is but little inflammatory reaction and the wound heals promptly; but occasionally a mild acute pharyngitis occurs when the uvula is thick and fleshy, as the result of the operation.

THE POSTNASAL SPACE OR NASOPHARYNX.

What diseases occur in the postnasal space?

Postnasal catarrh may be either secondary, as when a nasal or middle-ear catarrh discharges into the postnasal space, or the disease may be primary and extend to either of those organs. The nasopharynx may be blocked by posterior hypertrophies of the turbinated bodies, or by polypi, cysts, fibroid tumors, or malignant growths, springing from the posterior nares or from the vault of the pharynx. A somewhat common affection beginning generally in childhood is hypertrophy of the pharyngeal or Luschka's tonsil.

What is adenoid vegetations or hypertrophy of the pharyngeal tonsil?

Adenoid vegetations or hypertrophy of the pharyngeal tonsil (Fig. 98) is an overgrowth of the normal adenoid tissue of the pharyngeal vault. The affection is often associated with hypertrophy of the faucial tonsils, and generally commences in childhood, but may be met with in patients of any age.

What are the symptoms?

If the adenoid vegetations are at all large, they block up the posterior nares and compel mouth-breathing, the pinched nostrils and half open mouth giving the face a vacant and well-nigh idiotic expression (Fig. 99). Breathing is audible, even during the day, and there is always loud snoring during sleep. The voice is toneless, articulation is indistinct, and the hearing is more or less impaired.

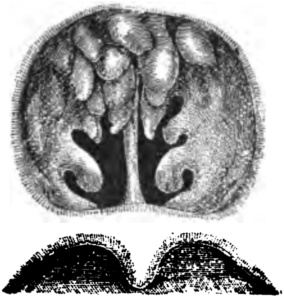

FIG. 98.—Adenoid vegetations.

What is the treatment?

Adenoid vegetations tend to disappear of themselves as the individual passes through adult age, but may, in the meantime, have produced irreparable injury to the ears, and even have altered the shape of the bones of the face. Application of Formula 10 to the postnasal space will sometimes bring about a slow absorption of the hypertrophied tissue, but the only treatment adequate in the majority of cases is a thorough removal of the mass by surgical procedures. Often the masses of adenoid tissue are so soft that they can be scraped away by means of the forefinger, introduced behind the soft palate. In adults Loewenberg's postnasal cutting forceps

(Fig. 100) may be used; the operator being careful to begin operating in the median line, and working from it in each direction until the entire mass is cut and torn away from its attachment, at the same time being exceedingly careful not to wound the orifices of the Eustachian tubes.

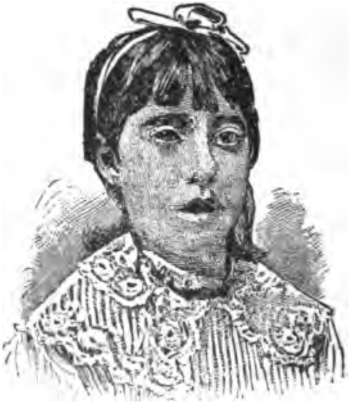

FIG. 99.—Facial expression resulting from hypertrophied tonsils.

In children, or in adults in whom the pharyngeal tonsil is still comparatively soft, Gottstein's curette (Fig. 101) is a most efficient instrument. Young children should be seated in the lap of a nurse, upon a piano-stool opposite the operator, in the same manner as for an ordinary examination of the nose and pharynx. The nurse passes her arms beneath those of the

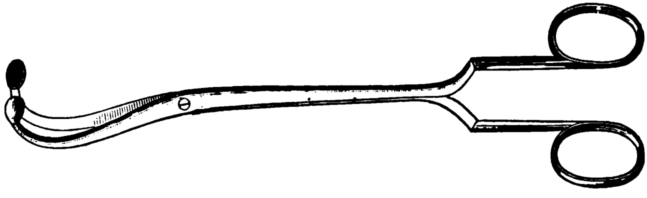

FIG. 100.—Loewenberg's postnasal forceps.

child, and places her hands, one on each side of the child's forehead, in such a manner as to control the movements of the head. When held in this manner, it is impossible for the child to clutch with his hand the operator or his instruments. The curet is now passed behind the palate, and the handle of the instrument depressed until the outer edge of the ring is felt to rest against the septum. By sweeping the ring backward and downward against the pharyngeal wall the growth is brought within the curet, and is scraped from its attachment. Without removing the instrument from the mouth, the maneuver is quickly repeated at each side of the median line, in order to be certain that the major portion of the growth has been removed. The nurse then releases the child's head, and the operator passes his left arm around the child's head and thrusts his forefinger hard against the child's cheek, in such a manner that the cheek protrudes between the child's open jaws so as to form a most efficient mouth-gag. The operator then quickly passes the forefinger of his right hand behind the child's palate until the posterior edge of the septum is felt. With the finger nail any remaining portions of the growth capable of obstructing the posterior nares are then easily scraped away from below upward. The orifices of the Eustachian tubes and Rosenmüller's fossæ are then located, and if any portion of the gland remains in these localities it is scraped away in the same manner. Even when done deliberately, the whole procedure requires less time than

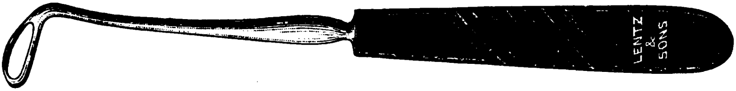

FIG. 101.—Gottstein's postnasal curet.

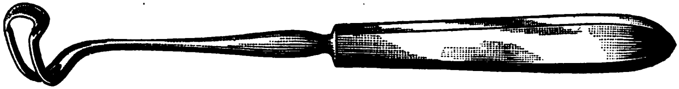

FIG. 102.—Gottstein's improved nasal curet.

to describe it. In older children and in adults Gottstein's improved curet (Fig. 102), with its sharp cutting edge, is the preferable instrument, as it is capable of removing larger and harder growths.

The operation should be performed quickly, but with gentleness, little force being required to sever the growth from its attachment. It is neither necessary nor desirable to remove the whole of the adenoid tissue, but simply that portion which interferes with nasal respiration and the functions of the Eustachian tubes. In very young children the parts of the growth removed by the curet are either swallowed, expectorated, or blown through the nose. The hemorrhage following the operation is generally trifling, and the after-treatment consists simply in keeping the parts clean with an antiseptic wash (Formulas 1 and 2).

When a general anesthetic is employed it should be ether and not chloroform, because in this condition it is extremely dangerous, somewhat numerous deaths having been reported. The ether should not be pushed to complete abolition of the reflexes, as even when only partially etherized the patient will probably become momentarily blue from partial asphyxia caused by the quantity of blood that generally enters the larynx.

Ether is rarely if ever necessary to secure an adequate removal of the hypertrophy. However the major portion of successful operators prefer to operate under ether anesthesia, stating that the operation then can be done more deliberately, and there is less danger of failure to remove all portions of the hypertrophy that are pathologic. The curetting should not be so radical as to expose the fibrous tissue overlying the vertebræ or expose or tear loose the upper border of the superior constrictor of the pharynx. During the operation the patient's head should be turned to one side or allowed to hang downward over the edge of the table in order to favor the escape of blood from the mouth and nose.

The improvement in nasal respiration and in pronunciation following the operation is immediate and pronounced; and if hearing was impaired as the result of interference with the function of the Eustachian tubes, the acuteness of hearing rapidly improves after the operation. In adults the reaction from the operation is but trifling. Children, however, sometimes complain for a few days that the throat is sore and that it hurts them to swallow.

DISEASES OF THE LARYNX.

ANEMIA OF THE LARYNX.

When is the presence of laryngeal anemia of especial importance?

1st. When associated with functional aphonia. 2d. When, during the course of an attack of chronic laryngitis, the mucous membrane covering the arytenoid folds, arytenoid cartilages, and ventricular bands is abnormally pale while the vocal cords are the seat of indolent congestion, the patient not being generally anemic. Each of the above conditions are premonitory of laryngeal phthisis.

HYPEREMIA OF THE LARYNX.

What is hyperemia of the larynx?

Hyperemia of the larynx is a congestion of the mucous membrane of the larynx, most marked where the submucosa is loose, fat, and thick, as upon the epiglottic folds, ventricular bands and ventricles; the epiglottis, vocal cords, and inferior cavity of the larynx being but little altered in color.

What is its significance?

Its presence renders an individual more prone to contract acute or chronic laryngitis.

What is its etiology?

Hyperemia of the larynx is oftenest the result of excessive smoking, especially of cigarette-smoking. It also results from working in dusty rooms, and amid irritating chemical fumes.

ACUTE LARYNGITIS.

What is acute laryngitis?

Acute laryngitis is an acute inflammation of the mucous membrane of the larynx, sometimes extending to the submucous tissue and muscles.

What other names is it known by?

Mucous laryngitis; catarrhal laryngitis.

What is its etiology?

Acute laryngitis is generally the result of exposure to wet and cold, the same causes that produce an ordinary coryza, acute laryngitis being in many instances simply an extension of the disease downward. Many individuals have a hereditary or acquired tendency toward laryngeal inflammations. The affection also occurs as a complication in measles, variola, scarlatina, typhoid, rotheln, and chicken-pox, and also as the result of traumatism, such as the inhalation of steam or irritating vapors. When acute laryngitis results from traumatism, the inflammation frequently assumes the edematous form of the disease, as the result of the submucous tissues being involved, while in children the croupous form is frequently met with, the mucous membrane of the larynx being covered with false membrane.

What are the symptoms?

The voice is altered in almost all cases, becoming in some almost aphonic, and its use extremely fatiguing and sometimes painful. In adults the respiration is generally unembarrassed, embarrassed respiration indicating that the inflammation is assuming the more serious character of edema. In children, on the contrary, embarrassed respiration is often the first symptom of the attack, the embarrassed respiration quickly assuming the spasmodic character of croup. The expectoration in adults is at first clear, frothy, mucopurulent, but somewhat scanty, abundant expectoration indicating that the disease has extended to the bronchi. Expectoration in children being always very scanty probably explains why the paroxysms of dyspnea are so severe and prolonged, the pain, tickling, and sense of tightness in the throat being in them more severe. The color of the mucous membrane of the larynx as seen in the laryngoscope is always heightened, but varies in different parts of the larynx and according to the degree of the inflammation, the cords in slight attacks being quite white, while in severe attacks they are so red as to be scarcely distinguished from the surrounding parts. The ventricular bands are also sometimes so swollen as to entirely cover the vocal cords, or the cords may be prevented from approximation by swelling of the posterior glottic commissure.

What is the treatment?

It is well to begin with the administration of a saline cathartic. The patient should remain in a warm room, avoid using his voice, and an application should be made to the interior of the larynx once or twice each day of a sedative and slightly astringent powder (Formula 22) by means of a powder-blower (Fig. 40). In making such an application to the interior of the larynx the patient is requested to grasp the tip of his tongue with a napkin and hold the tongue well forward. The operator, holding the laryngeal mirror in his left hand, introduces the mirror into the fauces in such a manner that he sees the reflected image of the glottis. The powder-blower should be held in the operator's right hand, and its nozzle is placed in the pharynx in such a position that it is seen reflected in the laryngeal mirror, and moved until it is observed to point toward the glottis. The patient is requested to say "a," and at the same instant the powder should be blown from the powder-blower into the larynx. When an individual says "a" or, indeed, makes any other sound with his vocal organs, the cords are brought together in order to produce it, so that any application made at that instant is limited to that part of the larynx above the cords. Should it be deemed necessary to apply the powder to that portion of the larynx which is below the cords, it may be accomplished by using the powder-blower while the patient holds his breath, or the powder may be carried deep into the bronchi, if the powder-blower be used while the patient is performing the act of inspiration. After the more acute stage of the disease has passed, Formula 20, or even 19, should be used instead of Formula 22 as an application to the interior of the larynx. In the more severe cases powders of any kind are not well borne, and under such circumstances relief will be obtained by spraying the larynx with a 4 per cent. solution of cocain, and after an interval with a 1 : 10,000 solution of adrenalin. In all cases of acute laryngitis the inhalation of hot, moist air answers a very useful purpose, and the patient may use at home a bottle-inhaler. The inhaler should be filled one-third full of hot water, to which may be added a teaspoonful of the compound tincture of benzoin, and should be used by the patient four or five times a day, the fumes of the benzoin, as well as the moist warm air produced by drawing the breath through the hot water in the instrument, exerting a decidedly sedative effect upon the inflamed mucous membrane of the larynx.

The application of cold or heat to the skin over the larynx gives decided relief in the more severe cases. As to the selection of heat or cold the sensations of the patient would seem to be the best guide. In the writer's experience heat is usually the more grateful. Cold may be applied by means of a Leiter coil or a small ice-bag or a napkin wrung out of ice-water and applied to the neck over the larynx. It should be changed sufficiently often to maintain the degree of cold desired.

Heat may be utilized by applying a Leiter coil upon the skin over the larynx in the usual manner and allowing hot water to flow through the coil. A folded napkin should be placed under the coil to protect the skin, and the temperature of the water should be as high as can be borne comfortably by the patient.

The more severe forms of acute laryngitis, fortunately rare, will require careful watching, and the physician should be prepared to prevent suffocation from edema of the glottis by scarifying the epiglottis or, if necessary, by intubation or tracheotomy.

SUBACUTE LARYNGITIS.

What is subacute laryngitis?

Subacute laryngitis is an inflammation of the mucous membrane of the larynx, subacute in character.

What is its etiology?

Subacute laryngitis commonly results from the same causes as the acute form of the disease. It generally attacks individuals of feeble constitution, or it may result from neglecting to treat properly the acute affection. Usually slight dyspnea and hoarseness are the prominent symptoms. The former, generally worse at night, sometimes occasions the patient alarm. Feeble individuals, especially children who spend most of their lives indoors, are more liable to attacks of this disease than the robust and those who are much out of doors. A frequent predisposing cause is the admixture of the products of combustion with the hot air supplied from furnaces. A careful supervision of the workman each fall when the furnace is put in order for the winter, so as to make sure that the parts of the fire-box are fitted too tightly to allow of any escape of carbon-dioxid gas into the hot-air chamber, will sometimes prevent every member of the household suffering from recurrent attacks of sore throat during the entire winter.

Certain dusty occupations and the frequent inhalation of irritating fumes produce chronic laryngitis and acute exacerbations of the inflammation. By far the most common cause is exposure to cold. However, it is not usually normal respiration of cold air that is responsible for attacks of acute laryngitis, because as long as the nose is normal the air inspired through it is moistened and its temperature raised sufficiently to render it harmless to the larynx. This is not the case, however, in individuals whose noses are sufficiently abnormal to necessitate mouth-breathing, and it is somewhat curious to note in this connection that during the first few years of a chronic nasal catarrh each cold is essentially nasal; but in the later stages of the disease the brunt of such attacks is borne by the larynx and trachea. This is probably not due to an extension of the catarrhal disease by continuity of surface, but to increasing hypertrophy of the turbinated bodies, rendering the individual a mouth-breather as soon as he inhales cold air. But it is not the inspiration of cold air that most frequently is responsible for an attack of acute laryngitis. Most individuals take cold through their feet. The ground is a much better conductor of heat than the atmosphere, and therefore the soles of the shoes should be of heavy material. The shoes should be loose about the ankles so as not to impede the circulation, and so constructed as not to prevent the evaporation of moisture. A dentist friend and patient informed me that he suffered for years with cold feet until he adopted the plan of wearing low shoes the entire year. During the winter his woollen underdrawers were made long enough to extend over the ankles and protect them. He wore cotton or light wool stockings.

What is its treatment?

The treatment is similar to that of acute laryngitis. A most important part of the treatment of acute laryngitis is rest, especially of the inflamed larynx. All unnecessary talking should be avoided, and no effort made to talk above a whisper. In the case of singers, orators, and actors, where it is of the utmost importance that a normal voice should be regained as speedily as possible, absolute rest in bed in a warm room will do much to hasten the desired result; $\frac{1}{3}$ of a grain of calomel with 5 grains of bicarbonate of sodium should be given every hour until six doses have been taken or the bowels freely moved. If the attack is of sufficient severity to cause some elevation of temperature and a hot, dry skin, drop-doses of tincture of aconite root should be given every fifteen minutes until three or four doses have been taken, and then every hour until the skin has become moist. Of the other internal remedies, yerba santa usually yields the most speedy and satisfactory results, especially in cases unaccompanied by fever and a hot, dry skin. A pill containing 1 or 2 grains of the extract combined with $\frac{1}{100}$ of a grain of strychnin should be given every two hours, or the patient may take half a teaspoonful of malto-yerbine every one or two hours.

Both cocain and antipyrin have sedative and astringent effects upon the inflamed mucous membrane of the larynx. The application of the former gives relief for only half an hour, and is followed by increased congestion. The effect of cocain can be maintained by frequent instillation of the drug or by following its use by a spray of antipyrin, which will maintain the local sedative effects of the cocain in many instances for from two to four hours.

Cocain, when applied to the posterior wall of the pharynx, produces a most disagreeable feeling of dryness, and in many instances violent retching and vomiting. In skilful hands the application of a 4 per cent. solution to the larynx yields decided relief; but the utmost care should be employed that none reaches the pharynx, or the suffering of the patient will be increased rather than alleviated. The solution should not be used in an atomizer, but carefully applied by means of a brush to the epiglottis and larynx with the aid of the laryngoscopic mirror.

However, its use readily may be dispensed with; the inhalation of the spray from an atomizer containing a 4 per cent. solution of antipyrin giving in most instances all requisite relief. The patient should be instructed to spray the larynx during inspiration every three hours.

Decided relief also follows spraying the larynx with a 1 : 10,000 solution of adrenalin chlorid every two or three hours. However, the relief afforded is not greater than that obtained from antipyrin.

After the more acute stages of the disease have passed, and in the milder attacks of hoarseness affecting singers, astringents yield better results than the antipyrin or adrenalin, and the spray from an atomizer containing a 2 to 4 per cent. solution of alumnol may be inhaled by the patient every hour or two with decided advantage. In singers and actors with slight laryngitis the neurotic element plays an important part, and voice-failure when on the stage is largely due to nervousness and fear. Under such circumstances a pill containing $\frac{1}{20}$ of a grain of strychnin or a teaspoonful of the fluid extract of coca in a glass of sherry wine, taken immediately before the curtain rises, will do much to secure a satisfactory control of the voice during the performance.

CHRONIC LARYNGITIS.

What is chronic laryngitis?

Chronic laryngitis is a chronic inflammation of the mucous membrane of the larynx.

What other name is it known by.

Chronic laryngeal catarrh.

What is its etiology?

It is generally the result of faulty use of the voice by singers or public speakers, and also of excessive smoking, especially cigarette smoking. The smoking of cigarettes is particularly injurious, not on account of the paper wrappers or any peculiarity of tobacco, but from the habit all cigarette-smokers soon acquire of inhaling the smoke and bringing it directly into contact with the sensitive mucous membrane of the larynx. It is the very "mildness" of the smoke from cigarettes, in comparison with cigar smoke or that of a pipe that make them more injurious. The convenience and cheapness of cigarettes also causes the cigarette-smoker to light a cigarette whenever he has a few moments to spare, and under circumstances when he would not think of smoking a cigar or a pipe, the ill effects of which are generally confined to the pharynx, and are most noticeable in those who while smoking indulge in frequent expectoration. Occupations that require working in a dusty atmosphere, and the frequent drinking of undiluted distilled liquors, are also causes of the disease, while the affection is sometimes simply the expression of the rheumatic diathesis. The presence of tumors inside the larynx may be classed as the result rather than the cause of chronic laryngitis.

What are the symptoms?

The voice is, as a rule, chronically hoarse, but the degree of hoarseness varies materially from time to time. In singers the injury to the voice will be manifested in loss of range, diminished endurance, and loss of control. As the disease advances all vocal efforts will be obviously strained and labored. Cough is by no means a constant symptom. The secretion is at no time very great in amount, and diminishes as the disease advances. It is thick, starch-like, and tenacious. Small amounts of mucus frequently collect in the inter-arytenoid space, and, being suddenly detached by coughing, are thrown out through the mouth to a considerable distance, while little bridges of mucus are sometimes seen with the laryngoscope extending from cord to cord in the larynx. There is a constant feeling of constriction, as of a foreign body in the air-passages. Upon inspection certain portions of the mucous membrane of the larynx appear redder than normal; and sometimes the entire mucous membrane of the larynx is of a uniform red color, with the exception of the cords, which may be somewhat lighter in color than the surrounding parts. The mobility of the cords is frequently impaired, either from swelling of the mucous membrane covering the arytenoids, or from slight muscular pain. Erosion of the interarytenoid space is frequently seen.

What is the prognosis?

Recovery from chronic laryngitis is always slow, and depends upon the faithfulness with which the treatment is carried out.

What is the treatment?

Constitutional remedies are not of the greatest importance; but, as in every other chronic affection, the general health should be improved as much as possible. Local treatment should consist of the daily applications to the affected mucous membrane of a sedative or astringent solution by means of the spray of an atomizer, Formula 8 being most useful for this purpose.

A 4 per cent. solution of alumnol usually yields even better results, but both solutions may be used, the antipyrin first, and then the alumnol.

As an office treatment applications, argyrol, 5 to 10 per cent. twice a week, sometimes yield excellent results, and the occasional application of nitrate of silver solution in obstinate cases is very beneficial. The use of the remedy requires some care, and a very little of the solution should be used until it is ascertained that its use is not followed by spasm of the glottis. Most larynxes will stand the application of a cotton-tipped applicator dripping with a solution of silver nitrate, 10 grains to the ounce, and solutions of a dram to the ounce cautiously can be employed. The unusually slight irritation produced by the application of even the stronger solutions sometimes lasts for several hours, but is followed by decided relief of hoarseness and congestion of the parts.

In the more severe cases pain, congestion, and hoarseness are sometimes quickly relieved by the insufflation of powdered orthoform or antipyrin. Milder astringent powders consist of 1 part alumnol and 2 parts milk-sugar, or sulphate of zinc, 15 grains to the ounce of milk-sugar, up to equal parts of the sulphate and milk-sugar. It may be used with good effect in all cases of laryngeal congestion.

LARYNGITIS SICCA.

What is laryngitis sicca?

In rare cases, catarrh of the larynx results in an exhaustion of the fluid elements of the laryngeal secretion, as the result of atrophy of the glandular elements of the mucous membrane. The disease is generally associated with atrophic rhinitis and pharyngitis.

What is its pathology?

The appearance of the laryngeal mucous membrane is similar to that of the nose and pharynx in atrophic rhinitis and pharyngitis. In some cases the parts are simply dry and glazed, looking as if varnished; in other cases there are accumulations of inspissated mucus, often greenish in color and emitting an offensive odor similar to that observed in atrophic rhinitis. The gross structural alterations that are seen in the nose in atrophic rhinitis are not observed in atrophic laryngitis. It is a disease characterized by diminished and perverted secretions rather than by atrophy of mucous membrane, submucous structures, and laryngeal cartilage. The masses of inspissated secretions cling to portions of the larynx where the glands are most numerous: the subglottic region and the upper surface of the ventricular bands.

What are the symptoms?

In cases where there are no accumulations the larynx feels dry and irritated. The voice is slightly hoarse, and tires upon the slightest exertion. In cases characterized by accumulation of fetid secretions, the sufferings of the patient are mainly due to the irritation produced by the presence of these secretions and by the patient's effort to rid himself of them. This sometimes is by no means easy to accomplish, and the patient's strength is exhausted by ceaseless and useless coughing, usually worse at night. Occasionally a little mass will be ejected from the larynx with considerable violence, bringing with it a small area of laryngeal epithelium, and producing a slight capillary hemorrhage which alarms the patient. In the few cases which the writer has seen—for the disease is somewhat rare—the patients were fairly well nourished.

What is the treatment?

In cases where the disease is the result of atrophic rhinitis, efforts should be directed toward improving the condition of the nose, so that the important function of warming and moistening the inspired air is restored. The wearing of cylinders of absorbent cotton within the nose, as directed for the treatment of atrophic rhinitis, is also valuable in bringing about an improved condition of the laryngeal secretions.

Patients with atrophic rhinitis do well in a moist climate. In one case all laryngeal symptoms had disappeared upon the return of a patient to Philadelphia after a year's absence in the Philippines. Internally may be given stimulating expectorants or drugs, such as iodid of potassium and hydriodic acid, that increase the secretions of the upper respiratory tract and render them more fluid.

Inhalations of steam or the use of the bottle-inhaler with hot water and tincture of benzoin aid greatly the patient's efforts to get rid of the annoying laryngeal accumulations. Great relief sometimes follows spraying the larynx with equal parts of hydrogen dioxid and Dobell's solution, because the action of the dioxid upon the accumulations softens them and increases their bulk, and hence aids their expulsion from the larynx. The irritation of the larynx is best controlled by spraying the parts with a 2 per cent. solution of antipyrin. Insufflation of the powdered drug undiluted or mixed with an equal amount of milk-sugar should be practised every two or three days, after first thoroughly cleansing the laryngeal mucous membrane by means of an alkaline spray.

INFLAMMATION OF THE SUBMUCOUS TISSUE OF THE LARYNX.

What is acute edema of the larynx?

Acute edema of the larynx usually is the result of phlegmonous inflammation with infiltration of the surrounding submucous tissue, frequently endangering life by occlusion of the rima glottis.

What other names is it known by?

Edematous laryngitis; phlegmonous laryngitis; acute edema of the larynx; edema of the glottis.

What is its etiology?

Edema of the glottis may result from traumatism, such as the swallowing of corrosive liquids. It occurs rarely as a primary affection, resulting from exposure to cold and wet in persons of debilitated constitution. In most instances, however, the disease is secondary, and results from syphilitic or tubercular perichondritis, retropharyngeal abscess, Bright's disease, glycosuria, etc.

What is its pathology?

The infiltration consists essentially of a serous or seropurulent fluid, most abundant beneath the mucous membrane of the aryepiglottic folds, the ventricular bands, and the ventricles; because the submucous tissue is most abundant in these regions of the larynx; but the edema is not always limited to that part of the larynx above the vocal cords, but may extend to the submucosa beneath the vocal cords. Infraglottic edema, as the disease is then called, is almost invariably secondary in its origin, and always serous in character

What are the symptoms?

In some cases there are no symptoms whatever prior to a fatal suffocation or syncope. The voice is usually rough and deep, or altogether lost, due to thickening and heaviness of the cords. In the early stages of an attack, the chief difficulty in breathing is during inspiration; but, as the disease advances, expiratory distress occurs, with the result of producing complete apnea. A short cough is present and deglutition is both difficult and painful. When the edema is considerable the sense of suffocation is most oppressive. With the laryngoscope, edema is quickly recognized; the infiltrated portion of the larynx being greatly swollen and semitransparent in appearance. When the edema is subglottic, the swollen mucous membrane of that region will almost always be seen of a more intense red than the cords above.

What is the prognosis?

Recovery from severe primary edema is always doubtful, and the prognosis in secondary edema depends upon the circumstances of the primary cause of the disease. The patient can hardly be said to be out of danger under two or three weeks from the commencement of an attack, and may even then become the subject of chronic infiltration. When death occurs it is almost always the result of carbonic-acid poisoning, and may be the direct effect of stenosis or spasm of the glottis. Another danger is the possible occurrence of suppuration—abscess of the larynx.

What is the treatment.

Free diaphoresis should be produced in suitable cases by the hypodermic use of $\frac{1}{12}$ to $\frac{1}{4}$ of a grain of pilocarpin. The temperature of the room in which the patient lies should be carefully regulated, and cold, dry applications kept upon the throat over the larynx by means of an ice-bag. As soon as edema is seen within the laryngoscope, local scarification with the laryngeal lancet (Fig. 103) should be performed. If, in spite of scarification and the use of pilocarpin, edema continues with increasing respiratory distress, general enfeeblement, and symptoms of carbonic-acid poisoning, intubation, or tracheotomy should be performed at once. Many lives probably have been sacrificed by hesitation and delay.

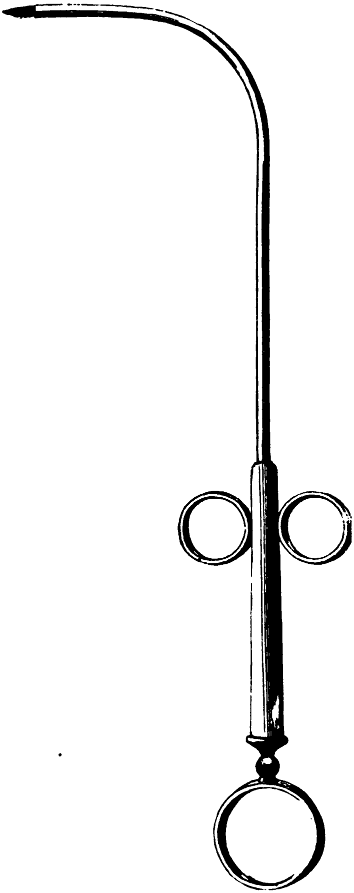

FIG. 103.—Laryngeal lancet.

LARYNGITIS SYPHILITICA.

What is laryngitis syphilitica?

Laryngitis syphilitica is an inflammation of the larynx due to syphilis.

What other names is it known by?

Specific laryngitis; laryngeal syphilis; syphilis of the larynx.

What is its etiology?

Syphilis of the larynx most frequently occurs as a manifestation of the tertiary period, three to thirty years after the primary infection. As a manifestation of secondary syphilis, laryngeal symptoms may occur within a few weeks, or may not appear until two or three years after syphilis has been contracted.

What is its pathology?

In secondary syphilis, the laryngeal symptoms may consist of a mere hyperemia, giving rise to the symptoms of simple laryngitis. Ulcerations may also be present, and are usually symmetric. That is, if an ulcer is present upon one part of the larynx, there is usually a similar ulcer also upon the corresponding part of the opposite side of the larynx. Syphilitic warts or condylomata are also frequently found in the larynx during the secondary stage of syphilis. They may undergo ulceration or disappear spontaneously. Tertiary manifestation consists of gumma, which may break down and cause deep ulcerations, with perichondrosis and necrosis of the cartilages; while stenosis may result from cicatricial contraction after the healing of syphilitic ulcers.

What are the symptoms?

The patient usually first complains of a slight hacking cough, hoarseness, and sometimes difficult and painful deglutition. Inspection with the laryngoscope reveals some of the lesions already specified.

What is the treatment?

Constitutional remedies already mentioned (see Syphilitic Rhinitis) should be employed. The bottle-inhaler, with compound tincture of benzoin, should be prescribed for the patient's use at home, in the same manner as for simple laryngitis, while an application of Formula 21 should be made to the interior of the larynx every other day with the powder-blower. If shallow ulcers are present they should be touched each day with the solid nitrate of silver melted on the end of a probe. This may be accomplished by melting a few crystals of the nitrate on a silver coin and dipping the end of a cold silver probe into it. Enough of the silver nitrate will adhere to the end of the probe to make one application. If, however, the ulcers are deep, such applications will not be sufficient to secure healing of the ulcer. They should first be touched by means of the cotton applicator every other day with the acid nitrate of mercury diluted with 5 parts of water, application of nitrate of silver being made on alternate days. After a time, when the process of repair is beginning to set in, these applications become painful and should be

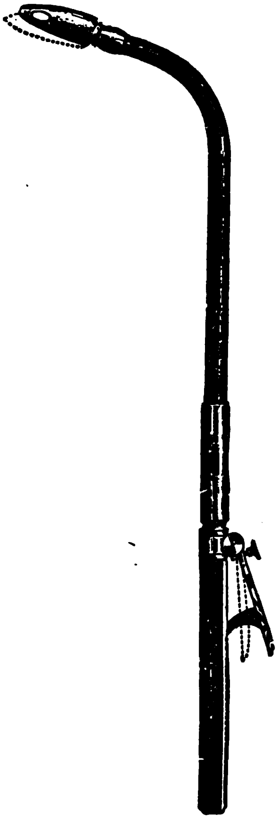

FIG. 104.—Browne's hollow laryngeal dilator with cutting blade (one-third measurement).

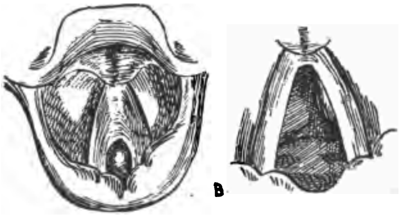

FIG. 105.—*A*, Cicatricial stenosis before treatment; *B*, the same after use of cutting dilator (Lennox Browne).

omitted, but insufflations of Formula 21 should be continued until the larynx presents its normal appearance. Should partial stenosis occur as the result of cicatricial contraction, the laryngeal stenosis may be overcome by the use of the laryngeal bougies or some suitable cutting instrument (Fig. 104).

LARYNGITIS TUBERCULOSA.

What is laryngitis tuberculosa?

Laryngitis tuberculosa is a chronic inflammation of the larynx due to the specific poison of phthisis, characterized by a peculiar ashy hue of the mucous membrane of the larynx, a pyriform swelling of the arytenoid cartilages in the early stages, and later on by turban-like swelling of the epiglottis, pseudopapillomatous growths, or shallow ulcers in the interarytenoid space or other portions of the larynx (Fig. 106).

What other names is it known by?

Phthisical laryngitis; tubercular laryngitis.

What are the symptoms?

The respiration is always more or less hurried, and becomes embarrassed in the later stages. There is a dry, hacking, painful cough, which in the later stages becomes looser, and the expectoration more abundant. Swallowing in the early stages is difficult, and in the later stages, painful. When the epiglottis or aryepiglottic folds are ulcerated, pain during deglutition is felt in the ear on the same side most affected in the larynx. In the very earliest stages, the mucous mem-

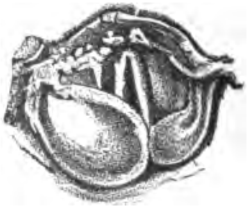

FIG. 106.—Laryngeal tuberculosis with characteristic pyriform swelling of the arytenoid cartilages (Lennox Browne).

brane of the larynx is simply pale and anemic, but later on the mucous membrane of the soft palate, as well as that of the larynx, becomes of a peculiar ashy-gray color, the arytenoids present a characteristic pyriform swelling, and the epiglottis becomes turban-shaped from deposits in the submucous tissue. Finally, ulceration occurs in the interarytenoid space and upon the cords, which present a peculiar "moth-eaten" appearance. The most characteristic appearance of laryngeal tuberculosis is the pyriform swelling of the arytenoids. Often one or both of them are swollen before physical examination reveals lung complications.

What is the treatment?

The treatment should consist, besides a proper diet, made up largely of raw eggs and milk and stimulants when required, in the local application of a sedative and anodyne powder (Formula 23) by means of the powder-blower. When ulcers are present, great comfort may be given the patient by the application of a solution of nitrate of silver of from 60 to 120 grains to the ounce of water. In the later stages of the disease, when the swallowing of food is exceedingly painful, a lozenge of gelatin, containing ½ grain of the muriate of cocain, dissolved in the mouth before each meal will enable the patient to take an adequate amount of food without great pain. However, the most useful remedy for the relief of painful deglutition is orthoform when ulceration is present. After cleansing the parts with a spray of peroxid of hydrogen, the powdered basic orthoform is insufflated by means of the powder-blower. After a preliminary smarting the parts become anesthetized and food may be swallowed in comparative comfort. The anesthetic effects of the orthoform may be greatly increased by a preliminary application of cocain. Orthoform has the advantage of cocain from the fact that its analgesic effects persist for several hours. The remedy also exerts a decided alterative effect, shallow ulcerations quickly improve in appearance and finally heal, orthoform exerts but feeble analgesic effects upon the unbroken mucous membrane, it is necessary that the nerve-endings be exposed by abrasion or ulceration. It is non-toxic and may be applied by means of a powder-blower by a nurse, or one of the patient's friends, ten or twenty minutes before each meal.

In deep ulcerations or when exuberant granulations are present the application of orthoform is not sufficient to bring about cicatrization. The ulcers should, if necessary, be curetted and syrupy lactic acid applied. These applications are painful even after the preliminary use of cocain, and at first a 25 per cent. solution should be used. However, later on the syrupy acid may be used undiluted by means of a cotton-tipped applicator. Care should be exercised to limit the application to the ulcerations and the parts immediately surrounding them. The application of lactic acid should be followed after an interval of a few moments by the insufflation of orthoform. Even when these precautions are taken, the applications of lactic acid are so painful that many patients are unwilling to submit to them sufficiently often to bring about a cure.

Where it is impossible to remove the patient to a suitable climate, the physician should see that if possible the room in which the patient sleeps is large, airy, and well ventilated, and that suitable precautions are taken to protect the other members of the family from the disease.

What is the prognosis?

Inasmuch as the laryngeal symptoms are dependent upon the lung affection, the prognosis is, of course, unfavorable. Laryngeal tuberculosis rarely, if ever, occurs as an independent affection, and is probably always secondary to the lung disease. However, the presence of laryngeal ulcerations with dysphagia greatly hastens the fatal termination.

LARYNGEAL TUMORS.

What tumors are met with in the larynx?

Papilloma, fibroma, angioma, myxoma, cyst, sarcoma, and carcinoma.

What are the symptoms of a tumor within the larynx?

The most noticeable symptom is mechanical obstruction to breathing, and phonation proportionate to its size and location. If the tumor is small and situated upon a vocal cord, dysphonia results from interference with its vibration, while, if the growth is situated in the anterior commissure, between the cords, aphonia results from the tumor preventing their approximation. If, however, the tumor is small and situated above the vocal bands, but slight, if any, subjective symptoms will be noticed. As the growth of a laryngeal tumor increases, dyspnea increases, and asphyxia may suddenly occur unless prompt relief is at hand. Cough is not usually present unless the growth is of such a character as to vibrate in the breath-current and titillate, as it were, the interior of the larynx, when cough and laryngeal spasms may occur. Chronic laryngitis is usually present as the result of laryngeal tumors.

What are laryngeal papillomata?

Papillomata found in the larynx of children offer some peculiarities. They are soft and usually multiple. They are usually associated with a catarrh of the nasopharynx and hypertrophied tonsils, and sometimes disappear under the application of astringent powders to the larynx and successful treatment of the nasal and pharyngeal affection, to the existence of which in many instances they seem largely due.

The papillomata of adults are harder than those of children, and are usually situated on the vocal cords or ventricular bands.

What is the etiology?

Any long-continued irritation of the laryngeal mucous membrane may result in hyperplasia and the growth of warts. When the result of long-continued catarrhal inflammation, papillomata usually occupy the interarytenoid space and the posterior extremities of the vocal cords.

Papillomatous growths are sometimes seen about tubercular ulcerations and upon the mucous membrane covering gummata and tumors lying underneath the laryngeal mucous membrane. Under such circumstances a piece removed by the forceps from the larynx may under the microscrope present the appearance of papilloma, and in its deeper parts that of carcinoma, and hence give rise to the erroneous impression that papillomata are prone to generate into carcinomata.

In case the papillomata occur in connection with laryngeal phthisis, syphilis, or a laryngeal tumor, they result from the irritation to the laryngeal mucous membrane caused by the primary disease.

Laryngeal carcinomata may be divided into intrinsic and extrinsic. Intrinsic carcinoma attacks the ventricular bands, the ventricle, and the vocal cords. Extrinsic has its origin upon the epiglottis, the aryarytenoid folds, and the pyriform sinus.

In extrinsic carcinoma the lymphatic glands are affected almost from the commencement, and the disease rapidly advances toward a fatal termination, and is rarely, if ever, cured by operation.

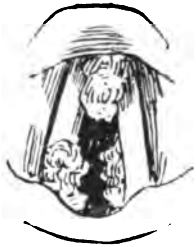

FIG. 107.—Laryngeal papillomata (Lennox Browne).

Intrinsic carcinoma is a less grave affection; its advance is less rapid, and the neighboring lymphatics often remain for a long time uninvolved. Extirpation, either partial or entire, should not be undertaken except the disease be intrinsic and limited entirely to the larynx.

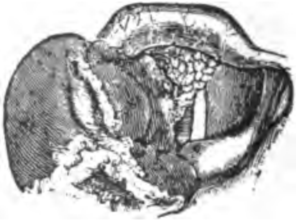

FIG. 108.—Cancer of the larynx (Lennox Browne).

What is the treatment?

Tumors springing from the epiglottis can usually be removed by means of a Jarvis snare with a curved lip, while cysts may be opened with the laryngeal lancet (Fig. 103) and their contents allowed to escape, after which the end of a probe on which nitrate of silver has been fused should be passed into the cyst and its interior thoroughly cauterized. Papillomata (Fig. 107) and soft or pedunculated tumors should be removed by means of the laryngeal forceps (Fig. 109), if necessary picking off piece after piece until the entire tumor has been removed. In every case of tumor of the larynx the emergencies of the case govern the operative procedures necessary. If the removal of the tumor is very urgent to prevent suffocation, and the patient's throat is too irritable to permit instrumental interference without danger of a fatal result from induced spasm of the glottis, tracheotomy should, of course, be performed before the removal of the tumor is attempted. If the growth is malignant, extirpation of the larynx, either in part or as a whole, gives the only hope of bringing about a cure of the affection.

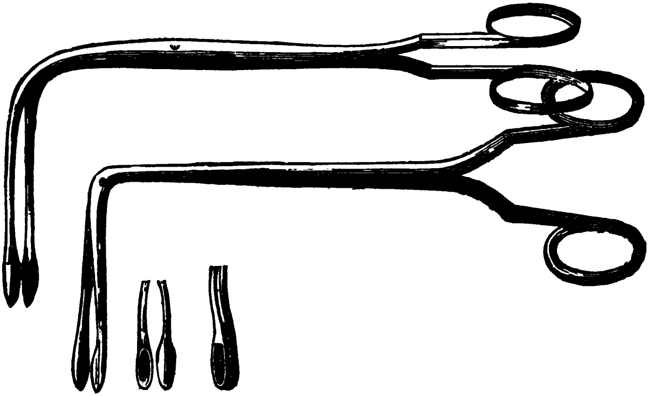

FIG. 109.—Mackenzie's laryngeal forceps.

FOREIGN BODIES IN THE LARYNX.

What foreign bodies are found in the larynx?

Smooth substances, such as small pebbles, shoe-buttons, seeds of various kinds, etc., are not apt to lodge in the larynx, but are either removed by a fit of coughing or drop into the trachea, where they cannot be removed. Substances with sharp points, like fish-bones or pins (Fig. 110), are often partially imbedded in the tissues of the larynx.

What is the treatment?

The foreign body should be removed with the laryngeal forceps when possible. In rare cases, a wound of the interior of the larynx is rapidly followed by edema of the glottis. Under these circumstances, tracheotomy should be performed before any attempt is made to remove the offending substance.

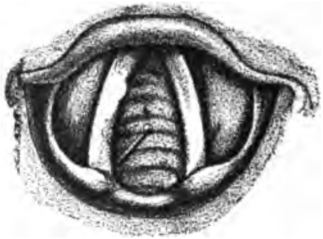

FIG. 110.—A pin imbedded in the posterior portion of the right vocal cord (Seiler).

LARYNGEAL NEUROSES.

What varieties of motor paralysis affect the larynx?

Paralysis may affect but one laryngeal muscle or pair of muscles; or it may affect several of them at once, and may be either unilateral or bilateral. Paralysis of the larynx may be divided clinically into paralysis of the adductors, paralysis of the abductors, and paralysis of the tensors of the cords.

What is its etiology?

The laryngeal muscles receive their nerve-supply by means of two branches of the pneumogastric: the superior laryngeal and the recurrent laryngeal. The pneumogastric, at its origin, is a sensory nerve, but receives motor fibers from the spinal accessory, so that it possesses both sensory and motor functions above the point where the superior laryngeal is given off. Paralysis of the laryngeal muscles may be due, like paralysis of other muscles, to (1) disease or injury of the brain involving the cerebral portion of the nerves that supply the larynx; (2) injury or pressure of the nerves below their cerebral portion; (3) an abnormal condition of the muscles themselves, and (4) some systemic dyscrasiæ, like rheumatism or hysteria, because of which the muscles are unable to respond to nervous influence.

Describe adductor paralysis.

Adduction of the vocal cords being performed by means of the lateral crico-arytenoid muscles and the arytenoideus muscle, paralysis of these muscles causes the cords to remain in a state of extreme abduction. This condition is in most instances due to hysteria, rheumatism involving either the muscles or the cricothyroid joint, or chronic poisoning by lead or arsenic. If bilateral paralysis exists, the vocal cords will be seen in the laryngeal mirror separated to the utmost degree (Fig. 111), and the voice will be completely lost. If paralysis of the arytenoideus muscle alone exists, which, however, is rarely the case, the anterior two-thirds of the vocal bands can be approximated; but a triangular space will be left behind the vocal processes during phonation, through which the breath escapes and renders the voice feeble, and its use in singing and speaking both fatiguing and unsatisfactory. This condition of affairs may occur during the course of either acute or chronic laryngitis from extension of the inflammation to the arytenoideus muscle (Fig. 112).

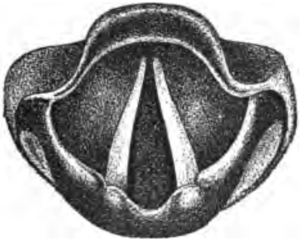

FIG. 111.—Bilateral paralysis of the adductors (crico-arytenoid lateralis and arytenoideus). Appearance in attempted phonation (Lennox Browne).

In unilateral adductor paralysis, only one cord is seen in extreme abduction during phonation, and the opposite cord will be observed to pass beyond the median line, so as to approach as near as possible to its motionless companion (Fig.

113). Although aphonia exists, the whispered words are usually perfectly comprehensible.

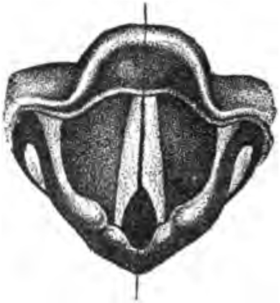

FIG. 112.—Bilateral paralysis of the arytenoideus (Lennox Browne).

Describe abductor paralysis.

Abduction of the vocal cords is accomplished solely by means of the posterior crico-arytenoid muscles, and hence the complete paralysis of both of them will prevent separation of the cords, and almost completely prevent the entrance of air into the lungs; a mere slit posteriorly, which represents the action of the arytenoideus, being the extent of the available breathing space. During expiration, however, the vocal cords are

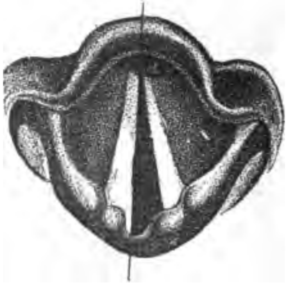

FIG. 113.—Unilateral paralysis of adductor of left cord. Appearance in attempted phonation (Lennox Browne).

forced apart by the ascending air-current impinging upon their under surfaces, which curves upward from the sides of the larynx. The voice is unimpaired in this affection, but where complete paralysis of the abductors exists it may be necessary to perform tracheotomy to prevent suffocation occurring as the result of slight inflammatory swelling of the mucous membrane of the larynx as the result of a cold. Paralysis of the abductors may result from a tumor in the brain involving the origin of both pneumogastrics and spinal accessory nerves. In such cases the abductors of the larynx are first paralyzed, but as the tumor increases in size paralysis of the muscles of the larynx results, the cords assuming the "cadaveric position" (Fig. 114). Paralysis of both posterior crico-arytenoid muscles may result also by pressure upon the recurrent laryngeal nerves by an aneurism, a goiter, or carcinoma of the esophagus, or the lesion may be located in the muscles themselves. When unilateral paralysis only is

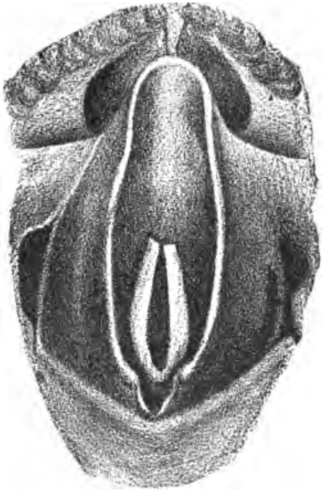

FIG. 114.—Appearance of the normal larynx after death, showing the "cadaveric position" of the vocal cords. This is also their position in quiet breathing (Lennox Browne).

present, the affected cord will be seen to remain always in the median line, even during forced inspiration, but subjective symptoms will be so slight as to hardly attract attention. The voice will be perfect and the breathing space ample, except during violent exercise (Figs. 115 and 116).

Describe paralysis of the tensors of the vocal cords.

Two forms of paralysis of the tensors of the vocal cords are met with, one due to paralysis of the cricothyroid muscle, which is rare, and the other one to paralysis of the thyro-arytenoids, which is not uncommon. Paralysis of the former muscle causes the edges of the cords to assume a wavy line, touching each other at irregular intervals during phonation (Fig. 117), while the voice is coarse and remains always at the same pitch. The upper surface of the cords appears convex during expiration and concave during inspiration. When the thyro-arytenoids are paralyzed, the cords assume a slightly curved appearance when an attempt is made to bring them together during phonation, and a slight space remains between their centers (Fig. 118). The voice is husky, high-pitched, and weak, the air escaping through the elliptical space between the cords, necessitating great effort on the part of the patient in order to speak.

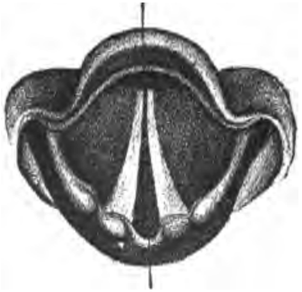

FIG. 115.—Bilateral paralysis of the abductors (crico-arytenoidei postici). Appearance with deep inspiratory effort (Lennox Browne).

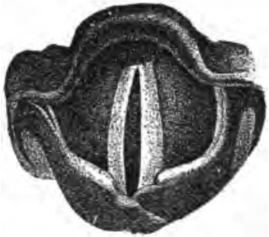

FIG. 116.—Unilateral paralysis of the left abductor. Appearance in phonation. The affected cord is seen to be in the cadaveric position, while the other is advanced beyond the median line (Lennox Browne).

What is the treatment of paralysis of laryngeal muscles?

The cause of the paralysis should be carefully sought and treated, the success of the measures adopted depending, of course, upon the nature of the primary ailment. In suitable cases strychnin should be administered in gradually increasing doses until the limit of toleration has been reached, and galvanism or faradism used by means of the laryngeal electrode Fig. 119), applied within the larynx as near as possible to the affected muscles. An ordinary sponge electrode is held by

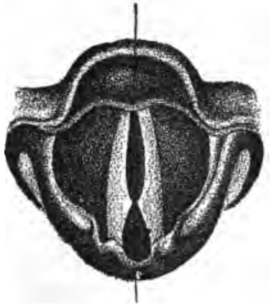

FIG. 117.—Bilateral paralysis of the thyro-arytenoidei and of the arytenoideus (Lennox Browne).

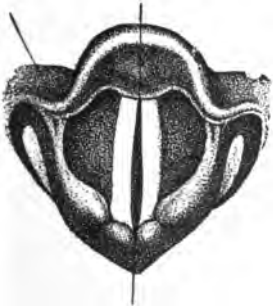

FIG. 118.—Bilateral paralysis of the sphincter of the glottis (thyro-arytenoidei) (Lennox Browne).

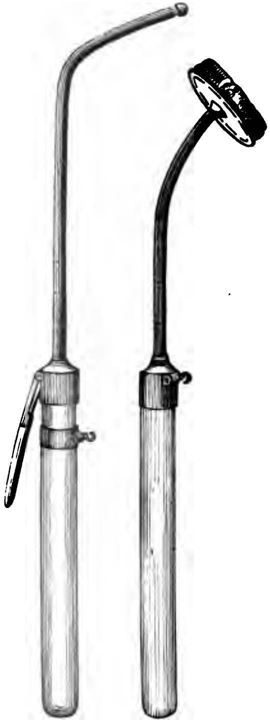

FIG. 119.—Mackenzie's laryngeal electrode.

the patient or an assistant upon the skin over the larynx, while the operator guides the tip of the electrode into the larynx, watching its progress with the laryngoscope, until it is in the desired position. The finger-rest on the top of the handle of the instrument is now depressed, and the current passes. Each application should last but a few seconds, and be repeated three or four times at each sitting, at intervals of one or two minutes. Electricity may be used in this manner every other day, the current used not stronger than is sufficient to secure contraction of the affected muscles. At first the mere introduction of the electrode into the larynx causes retching and gagging, and it may be necessary to apply a 10 per cent. solution of cocain to the interior of the larynx by means of a pledget of cotton wrapped about the end of a probe, and dipped into the solution, in order to anesthetize the parts sufficiently to admit of free manipulation at the first sitting. After a few trials, however, the parts become more tolerant, and applications can be borne, in the majority of instances, without trouble.

DIPHTHERIA.

What is diphtheria?

Diphtheria is an acute infectious disease characterized by a pseudomembrane which usually appears in the fauces, and is associated with a rapid pulse, moderate elevation of temperature, and more or less marked depression.

What is its etiology?

Diphtheria is endemic in all large cities, especially in the more crowded localities, and from time to time becomes epidemic, spreading to the outlying districts. It is more prevalent in the spring, autumn, and winter than in the summer. This is due to the cool, damp weather of these months, and also to the fact that the schools are not in session during the summer. It occurs most frequently in children between the ages of two and six years.

The specific cause is the Klebs-Löffler bacillus, which is a non-motile, straight or slightly bent bacillus with rounded ends. It is 2.5 to 3 mm. in length and .5 to .8 mm. in breadth.

What is the pathology?

The location and extent of the pseudomembrane varies in each case. It may be limited to the tonsils, or it may cover the entire fauces and extend into the nares and the larynx. It sometimes extends through the Eustachian tubes to the middle ear. The conjunctival mucous membrane is rarely involved. When a diphtheritic membrane is forcibly removed it invariably leaves a bleeding surface.

The bacilli are deposited in the fauces and first cause the membrane to become red, inflamed, and swollen. The poison kills the superficial layer of epithelial cells, which undergo coagulation-necrosis. There is a migration of white blood-cells, which also undergo coagulation-necrosis. These processes may only extend through the superficial layer of the mucous membrane, but sometimes extend deep into the tissues, and produce gangrenous ulcers. The color of the pseudomembrane is gray or grayish-white at first. It sometimes become yellow, but more often is white and flaky, like leaf-lard; it may also assume a dirty brown color, due to hemorrhage or to the local use of iron solutions.

Postmortem, the heart and blood-vessels show degenerative changes. The heart may contain a blood-clot. The lungs frequently show evidence of fibrinous pleurisy, bronchopneumonia, or capillary bronchitis. The liver and spleen show little if any change. The kidneys frequently show cloudy swelling. Degenerative processes have also been found in the nerve-trunks.

How may diphtheria be classified?

As *mild*, *well-marked*, *severe*, and *malignant*, when classified according to its severity.

When classified according to location, as *faucial*, *nasal*, and *laryngeal*. There nearly always is, or has been, some evidence of the disease in the fauces when either nasal or laryngeal diphtheria exists.

What are the symptoms of diphtheria?

In some cases of diphtheria there may be very few or no symptoms at all, except a slight indisposition on the part of the child, and the true nature of the disease may never be recognized unless by accident. The ordinary attacks of diphtheria, however, usually begin with chilly sensations up and down the spine; occasionally with a distinct chill, and rarely with a convulsion. This is followed by a rise in temperature, quickened pulse, headache, pains in the limbs, coated tongue, and sometimes nausea and vomiting. Frequently there is stiffness of the muscles of the neck. Sore throat and painful deglutition may or may not be present.

The temperature rises to 101° or 103° F. by the end of the first day. The pulse is rapid and ranges between 110 and 130. The throat looks red and inflamed at first, then there is a deposit of exudate on the tonsils, as a rule, and it spreads to the adjacent mucous membrane, or may limit itself to the tonsils. It is first of a gray or grayish-white color, which becomes white or a dirty yellow as it grows older. The glands at the angle of the jaw become swollen and sensitive. Constipation is frequently present. The urine is scanty and high colored. It may show albumin and even casts. In the ordinary cases the depression is never profound, and may be absent altogether.

In favorable cases, the disease reaches its height by the fifth or sixth day, but the temperature usually falls to normal on the third or fourth day. The exudate usually disappears by the tenth day and convalescence is well established. Sometimes paralysis follows, but very seldom in cases when the exudate is entirely limited to the tonsils.

In the severer types of the disease the initial symptoms are more pronounced. The depression is marked and comes on early. The fauces are greatly inflamed and the tonsils so swollen as to meet in the center of the pharynx. They are covered by a thick exudate, which greatly impedes respiration and distinct articulation. The uvula is edematous, swollen, and enlarged, and usually covered by the exudate, which extends forward to the hard palate, and may be in some cases nearly half an inch thick at the junction of the soft and hard palate. The posterior nares are involved by extension of the membrane up the posterior surface of the uvula. This often rapidly extends to the anterior nares, and both nostrils may become completely plugged by the exudate. There is a serous acrid discharge from the anterior nares, which excoriates the skin of the upper lip. The cervical glands are markedly enlarged and the cellular tissues of the neck are swollen and edematous. The edema at times extends down upon the sternum for several inches.

The temperature is usually normal or subnormal after the second or third day. The pulse is rapid, but soon becomes irregular and intermittent. The depression is marked from the beginning. The urine is scanty and high colored. Most all severe cases show albumin and casts. Vomiting is frequent. Epistaxis and hemorrhage from the fauces and buccal membrane is quite common. The breath is offensive. The patient rapidly grows pale and anemic. The skin on the face has a drawn and glossy appearance. The child may die in a few days, being overwhelmed by the diphtheritic poison, or it may linger for several weeks and die of toxemia or paralysis or from both. Any case of diphtheria, however severe, may recover, or death may occur suddenly from paralysis of the heart. When recovery takes place, convalescence is usually protracted and very tedious. Paralysis, either local or general, often supervenes.

Describe nasal diphtheria.

Nasal diphtheria usually occurs in conjunction with the faucial variety or it may follow it. Occasionally it occurs as a primary disease; then the symptoms are milder and the exudate is not so extensive. There is always a marked tendency to systemic infection whenever the nares are secondarily involved. Convalescence is slow and tedious in cases that recover.

Variations from the above descriptions are numerous, for no other disease presents so many phases as diphtheria.

What are the symptoms of laryngeal diphtheria?

Hoarseness and a high-pitched, metallic cough—the so-called croupy cough—which comes on in paroxysms. There is a slight rise in temperature and the frequency of respiration is slightly increased. As the exudate extends the hoarseness increases and aphonia results. Finally, the respiration becomes embarrassed and stridulous. The auxiliary muscles of respiration are brought into action. There is marked retraction in the supraclavicular and suprasternal spaces; also at the substernal space and at the border of the ribs. The alæ of the nose dilate with each respiration. The inspiration is long, deep, and labored, and more difficult than expiration, which may be comparatively easy. The child is restless, clutching at the sides of the bed or anything to raise itself up. The face is pale and bathed in a profuse perspiration. The patient has a wild, hunted expression. As the obstruction increases cyanosis appears, the extremities become purple, and the lips and face have a livid hue. Sometimes during a fit of coughing the membrane is expelled as a complete cast of the larynx, trachea, and sometimes even of the smaller bronchi. This, as a rule, only gives temporary relief, for the membrane quickly reforms and all the symptoms return. Unless these cases are relieved by intubation or tracheotomy, the cyanosis becomes greater until the child dies asphyxiated.

Describe diphtheritic paralysis.

It is a neuritis rather than a true paralysis, due to the absorption of the toxalbumins of the disease, and generally is proportionate to the severity and extent of the acute condition. Sometimes marked paralysis follows mild attacks, but this is unusual. It is difficult to say what percentage of diphtheritic cases are followed by paralysis, but it is estimated at from 10 to 20 per cent. The paralysis may be either local or general. The local variety is usually noticed by the end of the first week or during the second week. The first and most frequent paralysis is that of the palatal muscles, giving a nasal sound to the voice. Fluids are regurgitated when an attempt is made at swallowing. Strabismus and ptosis are sometimes seen. Paralysis of accommodation is not infrequent, and paralysis of the tensor tympani and stapedius occasionally occur. Facial paralysis is occasionally seen. Loss of power in the lower extremities with inability to walk is quite common.

General paralysis usually makes its appearance from the fourth to the sixth week, and all the muscles of the body may be affected except the sphincters, which are usually spared. When all the muscles of the body are affected, the temperature is usually subnormal, the pulse may be rapid and intermittent or very slow, sometimes falling as low as 20 beats per minute. When the paralysis is extreme, the child lays perfectly quiet, being unable to move, and frequently unable to swallow. There is usually associated with these conditions a low dragging cough, which is quite characteristic.

Describe systemic infection or toxemia.

Some of the mild cases have very little if any constitutional disturbance. On the other hand, some patients are overwhelmed by the poison in a few days, before the disease is fully developed locally. More often toxemia comes on later when the acute symptoms have subsided and the exudate disappeared. The patient appears bright and is apparently convalescing, except that his color is noticed to be growing paler. The pallor increases daily until the pink hue disappears from the lips, lobes of the ear, the palms of the hands, and soles of the feet. Exhaustion is extreme. The temperature is usually subnormal. The pulse may be very slow or very rapid. The extremities are cold. The stomach is irritable and non-retentive. The least bit of food, cracked ice, or anything will excite vomiting. The mind remains bright and clear. Such cases usually die of the toxemia and sheer exhaustion. These cases follow when the local disease has been extensive, and the nares have been considerably involved and the depression well marked.

However, sometimes there is extensive local disease and very little or no constitutional disturbance, but, as a rule, the constitutional disturbance and sequelæ are in proportion to the extent of the local lesion.

What are the complications of diphtheria?

Epistaxis is frequent when the nares are involved, and, in severe cases, hemorrhage from the fauces and buccal mucous membrane. Capillary bronchitis or bronchopneumonia is quite common and frequently fatal. It may occur during the height of the disease or during convalescence. A fibrinous pleurisy is frequently seen postmortem and occurs in conjunction with bronchopneumonia. Albuminuria is present in nearly all severe cases, and occasionally gives rise to alarming symptoms. Suppression of urine may follow, but the writer has never seen a case of general anasarca due to uncomplicated diphtheria. Otorrhea is not uncommon, and bacilli are found in the discharges for many weeks or even months after convalescence is fully established. Pericarditis and endocarditis may also occur, but are extremely rare. The writer has seen one case of gangrene of a lower extremity follow diphtheria; also one case of complete hemiplegia.

What is the diagnosis?

The characteristic pseudomembrane, which leaves a bleeding surface when removed, its gray or grayish-white color, and its tendency to spread to the adjacent mucous membrane. The swelling of the cervical glands and the presence of the bacilli renders the diagnosis in typical cases quite easy.

Mild cases may be confounded with follicular tonsillitis, and for the differential diagnosis the reader is referred to the chapter on Tonsillitis. The anginose variety of scarlatina may present some difficulty, but the strawberry-tongue, continued high fever, absence of the Klebs-Löffler bacilli, and the presence of the characteristic scarlatina rash will exclude diphtheria.

Bronchopneumonia may be mistaken for the laryngeal variety. In pneumonia the respirations are panting and quite rapid; in laryngeal diphtheria they are long, deep, and labored, and the stridor usually well marked. The history of a faucial or nasal diphtheria will often clear the diagnosis.

What is the prognosis?

Prognosis depends upon the character of the epidemic, the type of the disease, and the age of the patient. In some epidemics the disease is mild and the death-rate low. In others, especially in rural and suburban districts, the virulence of the disease is greater and the death-rate high.

In simple tonsillar diphtheria, the prognosis is good, but when the entire fauces and the nares are involved, it is grave.

The death-rate depends to a large extent upon the number of laryngeal cases requiring operative interference. From this class alone the death-rate varies from 30 to 75 per cent.

The age of the patient also influences the prognosis greatly.

Under one year of age, from 50 to 90 per cent. die; from one to five years of age, about 40 per cent.; from five to ten years, 26 per cent.; from ten to fifteen years, 12 per cent.; over fifteen years, 3 to 4 per cent. These are the figures of the Metropolitan Asylums Board of London, and they tally with the results obtained at the Municipal Hospital, Philadelphia. It will be seen from the above figures that the death-rate is in direct proportion to the age of the patient.

How is the treatment divided?

It is divided into (1) prophylactic; (2) local; (3) constitutional; (4) serums; and (5) operative.

What is the prophylactic treatment?

The prophylactic treatment consists in adopting those measures that will prevent the spread of the disease. This is best obtained by placing the patient in a well-ventilated room, preferably on the top floor, and having it isolated. All bed-linen, towels, and garments used by the patient should be disinfected with a carbolic solution (5 per cent.) before leaving the room, as well as all eating utensils. The attendants' clothing should be changed before mingling with other people. The physician should wear a linen duster or gown when visiting the patient. After the patient has recovered, the room and its contents should thoroughly be disinfected with formaldehyd gas.

What is the local treatment?

The object of local treatment is to reduce the inflammation, prevent the spread of the exudate, and remove what has already formed.

For this purpose peroxid of hydrogen, either in full strength or diluted to suit the case, is the best local application. It should be used in the form of a spray or upon a cotton swab.

Many favor astringent solutions, preferably of the iron salts; as,

℞ Acidi carbolici,	♏xv;
Ferri perchloridi,	f℥ij;
Glycerin,	
Aqua,	*āā* f℥j.—M.

To be used every hour or two by means of a swab.

The solvents, as lactic acid, pepsin, caroid, trypsin, have many advocates. Lennox Browne is very partial to lactic acid applied pure twice daily by the practitioner himself, and diluted to three or four times its bulk with water, applied by the attendants every two or three hours. Löffler's toluol solution gives good results in some cases, but care must be used in applying it. Whatever is selected, the practitioner should see that it does not increase the inflammation, or else it will do more harm than good.

What is the constitutional treatment?

Iron and mercury are the two drugs we have to rely upon in the treatment of this disease. They may be alone or combined as follows:

℞ Tr. ferri chloridi,	ʒij;
Syr. limonis,	
Glycerin,	*āā* ℥iij;
Aqua,	q. s. ad f℥iij.—M.

Sig. Teaspoonful every hour or two for a child four years old.

℞ Hydrarg. chlor. corros.,	gr. j–ss;
Tr. ferri chlor.,	fʒij;
Syr. limonis,	
Glycerin,	*āā* f℥iij;
Aqua,	q. s. ad f℥iij.—M.

Sig. Teaspoonful every hour or two for a child four years old.

Instead of the bichlorid, calomel may be given ($\frac{1}{10}$ grain doses every two hours). Chlorate of potassium is warmly recommended by some, given in 15 grain doses every two hours for an adult, and children in proportion.

Stimulants are indicated from the beginning, and among these alcohol is undoubtedly the best, and should be pushed to its physiologic limit in severe cases. After the exudate disappears, the whiskey should be gradually withdrawn and digitalis substituted. When the stomach is irritable digitalin should be given. A child five years old can be given $\frac{1}{30}$ to $\frac{1}{15}$ of a grain or more if necessary.

Strychnin is also useful, especially in the later stages. It can be given in larger doses than is ordinarily employed. When the paralysis is extreme the best results are obtained from hypodermic injections.

Describe the serum therapy of diphtheria.

To obtain the best results antitoxin should be used early in the disease, and, as it is harmless, it should be used in all cases of suspected diphtheria.

In mild cases, 1000 units, repeated the next day, will probably be all that is necessary.

In severe cases, it is well to begin with 2000 units as the initial dose and repeat every six, twelve, or twenty-four hours, until the symptoms begin to subside. When the disease persists it is sometimes necessary to give as high as 20,000 units in divided doses. Antitoxin of the highest potency should always be selected, for this gives the maximum number of units, and the minimum amount of serum. It should always be injected under antiseptic precautions to prevent abscesses, which occur in spite of antiseptic precautions in about one case in five hundred.

The report of the committee of the American Pediatric Society show a marked diminution in the death-rate of diphtheria since the advent of serum therapy in the treatment of the disease.

What are the indications for operative interference in laryngeal diphtheria?

(1) When the patient is cyanosed, together with marked retraction of the supraclavicular, substernal, and subcostal spaces, great restlessness, cold, clammy sweats, and a wild hunted expression in the eyes.

(2) When the symptoms of obstruction in the larynx are not so marked, but are rapidly growing worse, intubation preserves the strength of the patient.

(3) When the symptoms of obstruction are not progressing, but are sufficient to prevent the patient obtaining rest.

(4) In severe cases of nasal and faucial diphtheria, which develop laryngeal symptoms, intubation permits the patient to die easy.

What are the operations for laryngeal obstruction?

Intubation and tracheotomy.

Describe the intubation instruments.

Intubation was introduced to the profession in 1880, by

Joseph O'Dwyer of New York, and the instruments bearing his name are still the most satisfactory (Fig. 120). A set consists of six tubes with obturators, an introducer, an extractor, mouth-gag, and a scale graduated for measuring the length of a tube for a particular age.

How is intubation performed?

First select a tube suitable for the age of the patient, and pass a strong silk thread through the eye of the tube (about twenty inches long) and tie the two ends together. Then screw the obturator on the introducer and place the tube on the obturator. Next, wrap the patient tightly in a sheet with its hands at the side to prevent them from interfering with the operator. Have the nurse sit in a chair and hold the patient upon her lap with its back to her left chest and its

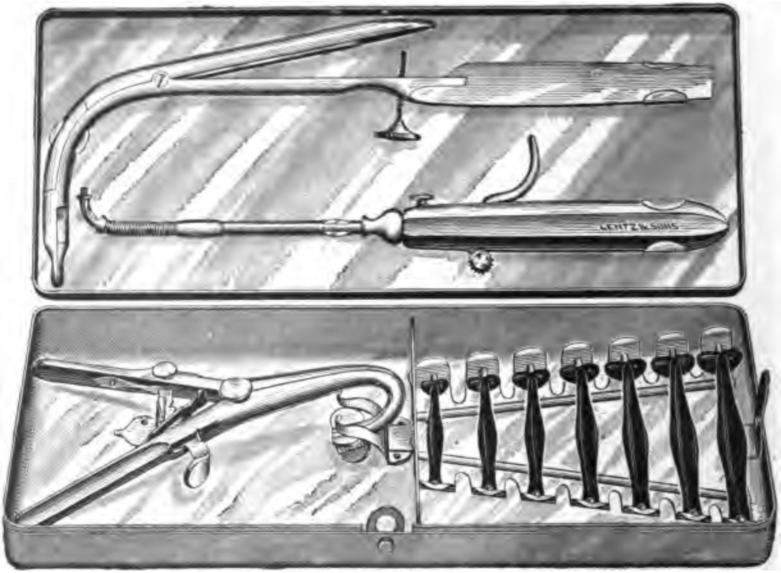

FIG. 120.—O'Dwyer's intubation set.

legs between her knees. The operator should sit in a chair facing the patient, and place the gag in the left corner of the mouth. An assistant standing behind the nurse should hold the gag and steady the patient's head between his hands. Then the operator, taking the introducer in his right hand and holding the thread attached to the tube on one finger, rapidly introduces the index-finger of the left hand over the tongue until it is behind the epiglottis, and the laryngeal orifice is felt. Then the tube is introduced over the tongue, being careful to keep it in the median line, until the tip of the finger at the opening of the larynx is felt. Next elevate the handle of the introducer until the tube is in a vertical position and it readily slips into the larynx. When the tube is in the larynx press forward the button on the top of the introducer, which releases the obturator. The finger should be placed on the head of the tube until the obturator is entirely withdrawn to hold the tube in position. Next, remove the gag, but hold the end of the string until you are satisfied the tube is in the larynx and the child has obtained relief. This usually requires three or four minutes. After respirations become easy, the string should be removed or plastered on the side of the face. To remove the string the gag should be placed in the mouth and the finger should be held on the top of the tube until the thread is removed, to prevent removing the tube also.

What accident sometimes follows intubation?

Occasionally the membrane of the larynx becomes detached and is pushed down before the tube, completely obstructing respiration. It does not often happen, but when it does the tube should be removed at once by pulling the thread attached to the tube. This is followed by a forced expiratory effort, which, as a rule, expels the membrane. When it does not, tracheotomy should be performed immediately.

Describe the conditions met with after intubation.

After intubation, deglutition is difficult, the patient being able to swallow only liquids and semisolids. The temperature may remain normal, but, as a rule, it rises to 102° to 103° F., and remains from one to two degrees above normal while the tube is in the larynx. When intubation gives perfect relief, the respirations are free and easy and the child is entirely comfortable. The coughing attendant upon deglutition is sufficient to keep the tube patulous; but should it become occluded or the respirations labored, the tube should be removed and cleansed. The reintroduction should depend on the character of the respirations after removal of the tube. In some cases the patient coughs up the tube when it becomes occluded, but when the tube is being constantly coughed up it indicates that it is too small, and a larger size should be used. In favorable cases the time for removal of the tube will depend to a great extent upon the age of the patient. In children six or seven years old the tube may be removed in four or five days; in younger children it should remain five to seven days. When death results after intubation it is almost always due either to the extension downward of the membrane or to bronchopneumonia.

An amazing and distressing complication that sometimes arises is the inability of the patient to breathe without the tube. Children sometimes are obliged to wear the tube one hundred and ten days, being entirely well, except that they could not breathe without it. The prolonged wearing of the tube sometimes produces ulcers in the larynx, which may result in complete occlusion of that organ, or so constrict the lumen that a tracheotomy is necessary.

How is extubation performed?

The patient is prepared in the same manner as for intubation. The gag is introduced and an assistant steadies the head of the patient. The operator introduces the left index-finger in the mouth until the tube is felt behind the epiglottis. Then with the extractor in his right hand the beak is glided over the tongue until the tip of the finger is felt at the opening of the tube, when the handle is elevated and the beak of the extractor slips into the tube. Then pressing the lever on top of the handle, the blades of the beak separate and hold the tube securely until it is withdrawn.

What is the treatment for an intubation patient?

When the nares are involved they should be syringed several times daily with the normal salt solution, otherwise local treatment is unnecessary and may be harmful. Steam generated in the presence of the patient is no longer considered necessary. Constitutionally, stimulants should be given as required, preference being given to alcohol and strychnin. Calomel in small doses often seems to do good in limiting the inflammation and preventing bronchopneumonia. Iron mixtures are difficult to swallow and are just as well omitted A simple cough mixture containing ammonia carbonas and syr. ipecac often aids in liquifying and expelling the mucus from the throat. The most important element in the treatment is the nourishment. Milk should be given freely. Broths of all kinds, beef-tea, milk-toast, and ice-cream may be given freely.

The method of administration of food and medicines is a much-mooted question. In nursing infants they take nourishment readily from the nursing-bottle. In such cases lowering the head makes swallowing easier, as none of the food gets into the tube. In older patients it is best to permit them to take their food from a glass or in any way they prefer. Struggling to make the patient take it in a specified way produces exhaustion and is harmful. When children will not take food, they should be fed by introducing a soft-rubber catheter through the nose into the stomach.

What are the indications for tracheotomy?

Tracheotomy is indicated in the same cases as intubation and for the same reasons. In addition, it is indicated in those cases of intubation where the membrane has extended below the tube.

Describe the operation?

The reader is referred to the text-books on surgery for the technic of the operation, as only a few points that bear an especial relation to diphtheria are enumerated here. On account of the great danger of pneumonia in all diphtheria cases, the high operation should be preferred as being less apt to produce that complication. The low operation should be performed, however, when it is done for the extension downward of the membrane below the intubation-tube, in order to get below it. The operation should be performed under antiseptic precautions and the wound should be kept dressed with moist bichlorid gauze. The inner tube should be removed and cleansed every hour or two or oftener if necessary. The air of the room should be kept impregnated with steam and the temperature about 80° F. The steam assists in keeping the secretions moist and liquid, and aids in their expulsion.

The constitutional treatment should be the same as that described under intubation.

What anesthetic is indicated?

Chloroform should always be given, for any dangers that may be attributed to its use are far less than the shock following the operation without any anesthetic. It seldom requires more than a few whiffs of chloroform to complete the operation.

Ether increases the spasm and should never be used, as it causes almost immediate suffocation.

Cocain may be employed locally in adults.

FORMULAS.

1. ℞	Sodii bicarbonatis,	
	Sodii biboratis,	*āā* ʒj ;
	Acidi carbolici,	ʒss ;
	Glycerinæ,	f℥j ;
	Aqua,	q. s. ad f℥iv.—M.

Sig. Add to a quart of water and use as a wash.

This is a modification of the celebrated "Dobell's solution," and is entirely bland and unirritating to mucous membranes. It may be used either as a spray to cleanse the mucous membrane of the nose, throat, and larynx, or may be prescribed as a wash for the patient's use at home. When used as a nose-wash by the patient it should be at a temperature of about 100° F.

2. ℞	Sodii bicarb.,	
	Sodii bibor.,	*āā* ʒj ;
	Sodii salicylatis,	gr. iij ;
	Menthol,	
	Thymol,	*āā* gr. j ;
	Glycerinæ,	f℥j ;
	Aquæ torrid,	f℥iv.—M.

Sig. Add enough water to make a quart, and use with an atomizer or as a nose-wash.

This formula yields a wash nearly as unirritating as Dobell's solution, and it has not the objectionable odor of carbolic acid. The concentrated wash is sufficiently antiseptic to preserve small anatomic specimens indefinitely, and the diluted wash will preserve them for a considerable length of time. The solid ingredients of the wash may be compressed into a tablet of such size that one added to four tablespoonfuls of water will make a wash of the requisite concentration. Under such circumstances borax should be substituted for the glycerin of the formula, in sufficient quantity to yield a wash of a specific gravity of 1020, because a wash of a much greater or less specific gravity than 1020 is more or less irritating to the nasal mucous membrane.

Both Dobell's solution and the wash, the formula of which is given above, should be compounded at least three or four days before being used. During this time carbonic acid gas escapes, and glyceroles and other compounds are formed that render the solutions much more bland and unirritating to the nasal mucous membrane. For this reason it is sometimes convenient to prescribe one of the following proprietary preparations:

3. ℞ Alphasol.
Sig. Dilute with 3 parts of water and use with an atomizer.

4. ℞ Glycothymolin.
Sig. Dilute with 3 parts of water and use as a wash.

Both are elegant preparations, and are preferable in most cases to a freshly prepared formula (1 or 2), but are less convenient than the tablets. Of the two, glycothymolin is the more bland, and hence is better adapted for the treatment of chronic and hypertrophic rhinitis. Alphasol has more decided antiseptic qualities, and may be used as a wash in atrophic and syphilitic rhinitis. Both are valuable as deodorizers, and may be considered as modifications of Dobell's solution.

5. ℞ Listerin,	f℥iii–vj ;
Aqua,	Oij.—M.

Useful as a disinfectant and irritating wash in atrophic rhinitis.

6. Hydrogen dioxid.

Useful in 15 volume solution or stronger to dissolve pseudomembranes.

Hydrogen dioxid in 15 volume solution is decidedly irritating to the Schneiderian mucous membrane and to the mucous membrane of the posterior pharyngeal wall. Therefore it should not be prescribed indiscriminately for all catarrhal inflammations of these regions.

7. Fluid albolin.

May be used with the atomizer and applied to the nasal mucous membrane as a protective. Besides the above, other bleached fluid cosmolins or albolins in the market are bland, unirritating, and free from the odor of kerosene, and answer admirably the purposes of the rhinologist.

Solutions of menthol and camphor in any of these oils are useful as sedative sprays. A formula frequently employed is 5 grains of menthol and 20 grains of camphor dissolved in 2 fluidounces of albolin. To this 2 or 3 drops of oil of eucalyptus, oil of pine, or oil of rose may be added.

8. ℞ Antipyrin,	gr. xvj;
Aqua,	f℥j.—M.

A solution of antipyrin of the above strength, when sprayed upon the mucous membrane of the nose, pharynx, or larynx, has the power of contracting the capillaries and producing an artificial anemia, which effect is maintained for three to five hours. The above solution may be used with the atomizer in all acute inflammations of the mucous membrane of the upper respiratory tract. When used after the application of cocain to the interior of the nose, it will maintain the contractile effect of that drug upon the erectile tissue for several hours. When sprayed upon the nasal mucous membrane without the previous application of cocain, it gives rise to a smarting sensation, which, however, quickly subsides. Applied as a spray within the larynx by means of an atomizer, it contracts the blood-vessels of the laryngeal mucous membrane and diminishes secretion, cough, and expectoration. It is extremely valuable as a remedy in the night cough of laryngitis phthisica, often securing a night's rest for such patients, who may be provided with an ordinary hand atomizer filled with a solution of antipyrin, and instructed to inhale its spray as is required to control the cough. When the patient is weak, he should be cautioned not to use at any one time more of the spray than is sufficient to moisten the interior of the larynx; and to guard against any depressing influence upon the heart, strychnin may be prescribed.

9. Solution of the hydrochlorate of cocain, 4 per cent.

The local anesthesia produced by the application of a 4 per cent. solution of cocain to the nasal mucous membrane, although later in making its appearance, is more profound and enduring than if a stronger solution were employed. The solution of cocain should not be used with an atomizer for the purpose of producing anesthesia of the nasal mucous membrane, as it is liable to find its way into the pharynx and produce a most disagreeable sensation, the throat "feeling as if it were full of cotton," or some of the solution might even be swallowed and produce an untoward constitutional effect. When it is desired to produce local anesthesia of any portion of the interior of the nose for the purpose of operation, a piece of absorbent cotton should be saturated with the cocain solution and laid in contact with that part of the nose where the anesthesia is desired, and, after the lapse of a few moments, the sensibility of the parts tested with a probe, and, if anesthesia has not been produced, the piece of absorbent cotton should be again dipped in the solution of cocain and replaced within the nose. Practically a bloodless operation can usually be secured by then spraying the parts with a 1 : 1000 solution of adrenalin hydrochlorid.

Anesthesia of the larynx should be produced by throwing a fine spray of a 10 per cent. cocain solution upon the laryngeal mucous membrane, and repeating the procedure after an interval of two or three minutes. Anesthesia of the larynx, produced by the application of a solution of cocain, appears quickly after the application and lasts only a short time.

Eucain and several other substances have been offered as substitutes for cocain, the claim being that they possess anesthetic qualities similar to those of cocain and are less liable to produce toxic effects.

10.	℞ Iodini,	gr. v;
	Potassii iodidi,	gr. xv;
	Glycerinæ,	f℥ij.—M.

11. Boroglycerid, 50 per cent.

12.	℞ Acidi tannici,	gr. xl;
	Glycerinæ,	f℥j.—M.

Formula 12 is an excellent application to the nasopharynx in the postnasal catarrh of adults. In children, Formula 10 generally yields better results.

The last three formulas may be used in the treatment of chronic rhinitis and hypertrophic rhinitis. The effects of the applications vary with the amount of the solution used. No more of the iodin solution should be applied at one time than will produce a momentary sensation of discomfort.

13. ℞ Tinctura ferri chloridi,
Glycerinæ, *āā* f℥ss.—M.

Useful as an application to erosions over varicose vessels in chronic nose-bleed.

14. ℞ Argenti nitratis, ʒi–ij;
Aqua, f℥j.—M.

Useful as an application to the pharynx or tonsils in acute pharyngitis or tonsillitis. When applied sufficiently early, will often abort the disease, if used two or three times a day. When painted upon the lateral walls of the pharynx it produces at once a feeling of relief and comfort which persists for some time; when painted upon the posterior wall of the pharynx, a sensation of dryness and great discomfort. Hence it should not be used in this portion of the pharynx except for touching small areas of granulation-tissue, etc.

15. ℞ Argenti nitratis, gr. x;
Zinci stearatis, ʒj.—M.

16. ℞ Argenti nitratis, gr. xx;
Zinci stearatis, ʒj.—M.

Formulas 15 and 16 are useful in the treatment of atrophic rhinitis. Formula 15 should be applied with the powder-blower to the nasal mucous membrane as long as its use is followed by a moderate amount of smarting and increased nasal discharge. When this ceases to occur, Formula 16 may be used.

17. ℞ Zinci sulphatis, gr. xvj–xx;
Aqua, f℥j.—M.

Useful as an application by means of a brush or a dossil of absorbent cotton to the larynx in subacute and chronic laryngitis, and to the nasopharynx in subacute nasopharyngeal catarrh.

18. ℞	Antipyrin,	ʒi–iij;
	Aqua,	q. s. fʒij.—M.

The latter formula is extremely useful as a daily application to the larynx in all forms of laryngeal inflammation. A brush or a dossil of absorbent cotton wrapped about a bent probe should be saturated with the solution and applied to the glottis. The application of antipyrin solutions of the strength of 50 per cent. and upward produces a burning sensation, quickly followed by a sensation of relief and comfort. Applied in this manner to the larynx, antipyrin is not an anesthetic, but an analgesic whose effects persist for several hours. In the strength of 5 to 10 per cent. solution antipyrin is superior as an antiseptic to Van Swieten's liquid. In therapeutic doses antipyrin acts as an antispasmodic, diminishing the reflex excitomotor power of the spinal cord, and also as an analgesic, relieving the pain of neuralgia and migraine, whether due to reflex nasal irritation or to some other cause. Applications of strong solutions of antipyrin to the larynx should be supplemented by the patient inhaling five or six times a day the spray from an atomizer containing a 4 per cent. solution (Formula 8).

19. ℞	Zinci sulphatis,	
	Sacchari lactis,	*āā* gr. xv–ʒj;
	Acaciæ,	gr. x.—M.

20. ℞	Alumnol,	ʒj;
	Sach. lac.,	ʒij.—M.

Useful as applications to the laryngeal mucous membrane in acute and chronic laryngitis. In cases in which bronchitis as well as laryngitis is present the powder should be applied during deep inspiration, in order that it may reach the trachea and bronchi.

21. ℞	Iodoformis,	gr. xxx;
	Acidi tannici,	gr. xx;
	Sacchari lactis,	gr. xxx.—M.

Useful as an application in syphilitic and tubercular laryngitis.

22. ℞	Bismuth. subnitratis,	ʒij ;
	Acaciæ,	gr. x ;
	Iodoformis,	ʒss ;
	Morphiæ sulphatis,	gr. xx ;
	Acidi tannici,	gr. xxx.—M.

Useful as an application to the laryngeal mucous membrane in tubercular and syphilitic laryngitis, and in the earlier stages of acute laryngitis, or in any laryngeal affection characterized by irritability and pain.

23. Orthoform.

This nearly insoluble substance has the property of producing analgesia when applied to exposed nerve-endings. It is, therefore, especially valuable as an application to irritable ulcers after they have been cleansed with Dobell's solution or peroxid of hydrogen. Its anesthetic effects are increased by a previous application of a solution of cocain and persist for four or five hours. When insufflated into a tubercular larynx the powder produces a momentary smarting, followed by analgesia more or less complete, which persists as long as the powder adheres to an abraded surface or an ulcer. The powder possesses decided antiseptic qualities and promotes the healing of tubercular ulcerations. It has little effect upon the unbroken mucous membrane, and its prolonged application to the skin in the neighborhood of ulcerations sometimes causes eczema.

A nurse or one of the patient's friends can be taught to insufflate orthoform into a tubercular larynx ten minutes before each meal, and in many instances thus secure complete relief from dysphagia. Orthoform is said to be non-toxic, and hence may be used locally in liberal quantities.

24. ℞	Menthol,	gr. j ;
	Sodii bicarb.,	gr. ij ;
	Magnesia carb. (levis),	gr. iij ;
	Cocain. hydrochlor.,	gr. iv ;
	Saccharis lactis,	ʒiss.—M.

Sig. Use as snuff.

The most marked relief follows the use of this powder, and a few applications will do much to abort acute rhinitis. Its effects are immediate, highly agreeable to the patient, and continue for a number of hours.

25. ℞ Tinctura gentianæ comp.,		fʒij ;
Elixir cinchonæ,		f℥j ;
Syrupi limonis,		f℥ss ;
Spiritus frumenti,	q. s. ad	f℥viij.—M.

Sig. Dose, one or two tablespoonfuls.

A useful formula where it is desired to administer an alcoholic stimulant, but where it is undesirable from any cause to advise the use of whiskey pure and simple.

26. ℞ Hydrargyri bichloridi,	gr. j ;
Potassii iodidi,	ʒij ;
Aqua,	f℥iij.—M.

Sig. One to three teaspoonfuls after meals.

This formula, sometimes called "1, 2, 3 mixture," may be ordered when it is desired to employ the mixed treatment in syphilis.

27. ℞ Tablet triturat. hydrarg. protiodidi, gr. $\frac{1}{4}$.

Sig. One tablet may be taken three or four times a day or even oftener, with a sufficient quantity of opium, if necessary, to prevent diarrhea.

Useful in the treatment of primary and secondary syphilis.

28. ℞ Pil. hydrarg. biniodidi, gr. $\frac{1}{16}$–$\frac{1}{8}$.

Sig. One pill may be taken after each meal.

Useful in the treatment of the later stages of syphilis.

29. ℞ Cocain. hydrochloratis,		gr. ss ;
Gelatin,	q. s. fiant troch.	No. 1.—M.

The above troche, taken before each meal, will often enable a patient with phthisical laryngitis or cancer of the larynx to swallow a sufficient quantity of nourishment, when otherwise it would be impossible, on account of the pain. However, the analgesia produced by the use of these lozenges is less than that produced by insufflations of orthoform (Formula 23).

30. ℞ Potassii bromidi,		℥ss ;
Potassii cyanidi,		gr. iss ;
Ext. prunus virginianæ,		f℥ss ;
Ext. grindelia robusta,		f℥iij ;
Muc. acaciæ,		
Aquæ dest.,	*āā* q. s.	f℥iv.—M.

Sig. Teaspoonful in water four times a day.

Useful as a cough mixture.

31. ℞ Tincturæ ferri chloridi,		f℥ij ;
Potassii bromidi		ʒij ;
Potassii chloratis		ʒiij ;
Ext. glycyrrhizæ,		ʒj ;
Aqua,	ad	f℥vj.—M.

Sig. A teaspoonful of water every two hours, gargle and swallow.

Useful in acute pharyngitis and tonsillitis.

32. ℞ Potassii chloratis,		
Potassii bromidi,		
Ext. glycyrrhizæ,	*āā*	gr. iij ;
Tr. ferri chloridi,		♏iss. – M.
Fiant troch. No. 1.		

Sig.—One every two or three hours.

Useful in acute pharyngitis, tonsillitis, and laryngitis.

33. ℞ Tr. guaiac. ammoniatæ,	f℥j.

Sig. One-half teaspoonful in milk every three or four hours, gargle and swallow. See Formula 44.

Useful in acute pharyngitis or tonsillitis of rheumatic origin.

34. ℞ Potassii bromidi,		℥ss ;
Potassii iodidi,		ʒiss ;
Ext. glycyrrhizæ,		ʒiss ;
Aqua,	q. s. ad.	f℥iv.—M.

Sig. A teaspoonful three or four times a day.

Useful in pharyngitis sicca, to increase the pharyngeal secretions and relieve the feeling of dryness in the throat.

35. ℞ Acidi tannici,
Acidi gallici, *āā* gr. xx.—M.
Sig.—Add to a tumblerful of water, and slowly sip the mixture.

Useful in controlling oozing of blood from the wound after amputation of the tonsil.

36. ℞ Pil. atropia sulphatis, gr. $\frac{1}{200}$.
Sig. One every three or four hours.

Useful in controlling excessive nasal secretion in coryza, hay-fever, and nasal hydrorrhea.

37. ℞ Hydrarg. bichlor., gr. $\frac{1}{4}$;
Acidi arseniosi, gr. $\frac{1}{3}$;
Ferri pyrophos., gr. vj;
Quinia sulph., gr. xv.—M.
Ft. pil. No. xxiv.
Sig. One after meals.

Useful as a tonic pill in catarrh of the nose and throat, with a debilitated condition of the system.

38. ℞ Hydrargr. bichlor., gr. iij;
Aquæ destil., f℥j.—M.
Sig. Corrosive sublimate solution for hypodermic use.

♏x = gr. $\frac{1}{16}$. ♏xiij · gr. $\frac{1}{12}$. ♏xv = gr. $\frac{1}{10}$. ♏xx = $\frac{1}{8}$.

Useful in syphilitic affections of the nose and throat where it is advisable to get the patient under the influence of mercury as speedily as possible. The injections may be made as often as once a day, deep into the cellular tissue of the back. The injection causes a moderate amount of pain, which continues for about an hour, and the place where the injection was made remains a little sensitive to the touch for twenty to forty-eight hours; abscess does not occur when the proportion of corrosive sublimate is not greater than in this formula.

39. ℞ Tr. benzoin comp.
Sig. Add half a teaspoonful to the inhaler one half full of hot water. Use the inhaler four or five times a day.

Useful in most forms of laryngeal inflammation. To the above formula, when requisite, an expectorant—ammonia muriat., fluid extract of senega or ipecac—may be added. When it is desired to diminish expectoration, and at the same time produce a sedative effect upon the laryngeal mucous membrane, fluid extract of belladonna or hyoscyamus in combination with the compound tincture of benzoin will yield satisfactory results.

40. ℞	Atropiæ sulphatis,	gr. ss–iss;
	Aquæ destil.,	f℥ij.—M.

Sig. Use with an atomizer every two hours.

Useful in nasal hydrorrhea. The patient should be informed that the solution is highly poisonous, and cautioned against using a larger quantity than sufficient to barely moisten the nasal mucous membrane each time the atomizer is used.

41. ℞ Liq. adrenalin hydrochlorid, 1 : 1000.

Adrenalin hydrochlorid, when applied to mucous membranes, is said to be the most powerful astringent known, and produces its maximum effects within one minute after the application is made. When used after cocain within the nose, a practically bloodless operation can sometimes be secured. However, adrenalin hydrochlorid will not prevent hemorrhage if a large vessel be cut, and its use is said to render secondary nasal hemorrhage more probable after operations.

It is used locally in the treatment of hay-fever and asthma in the strength of 1 : 10,000 or 20,000. Stronger solutions are less advantageous if the remedy is to be continued for some time, because of a reaction similar to that of cocain. Two to five grains of the powdered gland may at the same time be given internally, the patient being instructed to cease taking the drug if disagreeable heart-symptoms manifest themselves.

The hydrochlorid of adrenalin is active in as weak solutions as 1 : 20,000. Stronger solutions up to 1 : 500 may also be used inside the nose. Solutions of adrenalin hydrochlorid, unless prepared with especial precautions, somewhat readily decompose.

42. ℞ Lignol.

Lignol is an oily or tarry substance resulting from the distillation of a special lignite. It is soluble in ether and oils, but not in water. It contains phenol, guaiacol, xylenol, etc., probably combined with pyridin bases. It has antiseptic properties equivalent to a 1:1000 bichlorid solution, and when properly diluted is not irritating to mucous membranes. It is a useful application in atrophic rhinitis, diluted with an equal amount of sweet oil or albolin.

43. ℞ Glycerol tannici, ℥j.
Sig. A teaspoonful in a half tumbler of water. Use as a gargle.

Gargles have a deservedly bad reputation in the treatment of diseases of the throat, as owing to the stupidity or ignorance of the patient they rarely reach the pharynx and almost never the larynx. Children cannot use a gargle, and rarely is it practical to teach a patient to gargle during an ordinary office visit. However, the above is an effective and cheap astringent gargle, chiefly useful in dispensary practice.

Remedies are probably best applied to the pharynx and larynx by means of an atomizer, but when this is impracticable, as in the case of children or business men whose employment calls them away from home during the entire day, a suitable lozenge answers an admirable purpose. The lozenge should be made with a suitable excipient, so that it will dissolve somewhat slowly in the mouth, and thus secure prolonged contact with the inflamed pharynx or larynx. The favorite excipients seem to be black-currant paste and gelatin. Because of the length of time required for the drying of lozenges, druggists cannot quickly make lozenges from the prescription of a physician, and it is therefore better in most instances to rely on the manufactured product of lozenge-makers, some of whom have national or international reputations. The following formulas, copied from the catalogues of a well-known American and an English manufacturer, are standard preparations, and are convenient and useful.

LOZENGES OF GUAIACUM AND ITS COMBINATIONS.

44. Troch. guaiac.
The lozenges are stimulant and alterative, and are capable of arresting recent inflammation of the tonsils.

These lozenges should contain 2 grains of the resin of guaiacum, and are useful in the treatment of acute and subacute inflammation of the pharynx and acute follicular disease of the tonsils.

Mackenzie claims that guaiacum is a specific in acute tonsillitis, and Sajous is equally emphatic in praise of the remedy.

45. Troch. guaiac. comp.

℞ Resin guaiac.,	gr. ij ;
Potassii iodid,	gr. j.—M.

(Wm. Pepper.)

Stimulant and alterative. Efficient in throat disorders with syphilitic taint. Is especially useful when in acute inflammations of the tonsils there is a sensation of dryness, as the iodid increases secretion.

46. Troch. guaiac. and tannin.

℞ Resin guaiac.,	gr. iss ;
Acidi tannici,	gr. $\frac{1}{4}$.—M.

Stimulant and astringent, probably the most useful of the guaiacum lozenges in acute and subacute inflammation of the tonsils, pharynx, and larynx. Useful in the so-called "relaxed throats" of public speakers.

47. Troch. guaiac. and benzoic acid.

℞ Resin guaiac.,	gr. ij ;
Acidi benzoici,	gr. j.—M.

(J. F. Martenet.)

Stimulant in nervomuscular weakness of the throat. It is somewhat useful in the treatment and the loss of control of the laryngeal muscles experienced by nervous actors, singers, and orators, and those of these professions who have lost confidence in their powers as the result of subacute inflammation of the pharynx and larynx. In addition to the lozenge, $\frac{1}{20}$ gr. of strychnin or a dram of fluid extract of cocoa in an ounce of sherry wine may be prescribed, to be taken a few moments before going upon the stage or platform.

Any one of the above guaiacum lozenges may be used every one, two, or three hours, according to the acuteness of the inflammation.

Lozenges, containing the following drugs, are sometimes of service:

48. Ipecacuanha.

Readily taken by children. These lozenges should be of the same strength as the lozenges of the British Pharmacopeia.

49. Rhatany.

Astringent.

50. Chlorate of potash and borax.

Containing these two useful remedies in combination.

51. Red gum.

Astringent.

52. Eucalyptus (gum and oil).

Antiseptic, stimulant, and astringent.

53. Cocain, gr. $\frac{1}{20}$.

Sedative to the mucous membrane.

54. Cocain, gr. $\frac{1}{10}$.
55. Codein, gr. $\frac{1}{8}$.

Sedative.

56. Compound eucalyptus (red gum, chlorate of potash, and cubebs).

57. Chlorate of potash, borax, and cocain.
℞ Chlorate of potash, gr. ij;
Borax, gr. j;
Cocain, gr. $\frac{1}{20}$.—M.

58. Eucalyptus oil.

Antiseptic and stimulant.

59. Menthol, gr. $\frac{1}{20}$.

60. ℞ Menthol,
Cocain, āā gr. $\frac{1}{20}$;
Red gum, gr. ij;
Chlorate of potash, gr. v.—M.

61. ℞ Menthol,	
Cocain,	*āā* gr. 1/20.—M.

Stimulant, antiseptic, and sedative.

62. ℞ Potas. chlorat.,	gr. ij;
Ext. eucalypti rostrat,	gr. j;
Pulv. cubebæ,	gr. ¼;
Sacch. lacti,	q. s.—M.

Sig. One every hour or two for dry throat and hoarseness.

63. Campho-menthol,	gr. 1/10.

Useful in simple sore throat and cough, etc.

64. Orthoform,	gr. j;
Campho-menthol,	gr. 1/10.

Sig. One, or a portion of a lozenge, dissolved slowly on the tongue, as required.

A substitute for cocain as an anesthetic in post-operative throat work, in painful deglutition from tubercular lesions of the larynx, and in acute tonsillitis and pharyngitis. These lozenges are very effective, perfectly safe, and free from bad after effects.

65. Terpin hydrat.,	gr. ij;
Ammon. chlorid,	gr. j;
Ext. glycyrrhiza,	gr. ss;
Pulv. ipecac.,	gr. 1/10;
Codein, gr. ½, or heroin,	gr. 1/40.—M.

Sig. One every hour for dry pharyngitis and spasmodic cough.

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